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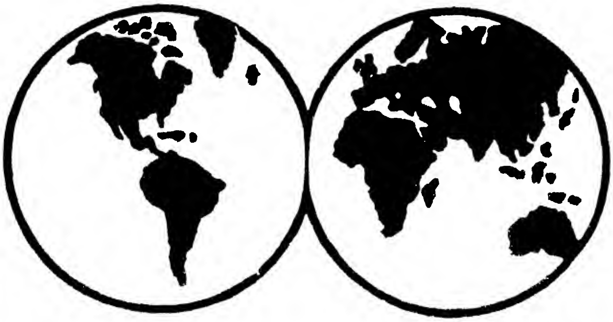

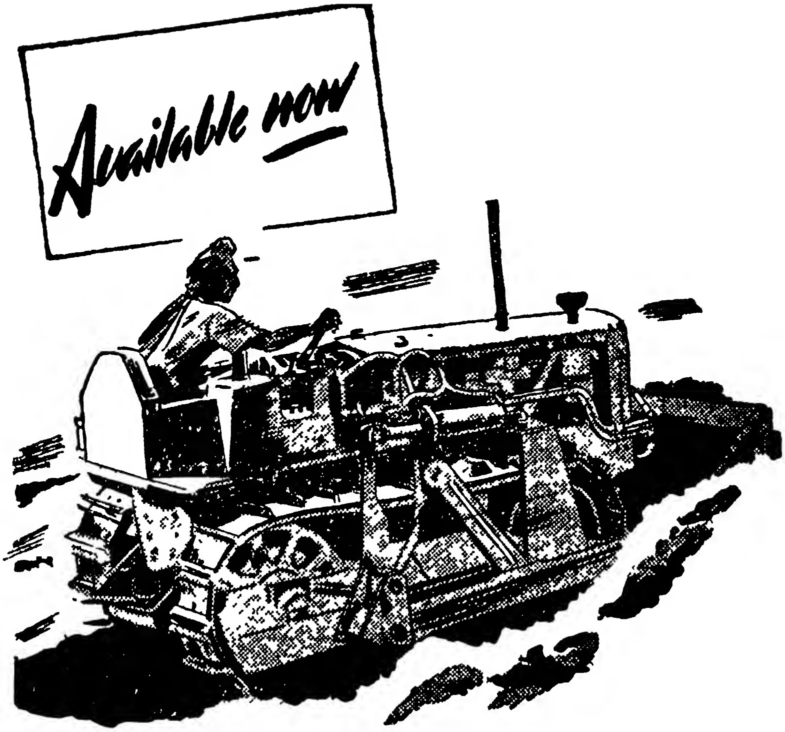
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FACT

Vol. 2 August 1947 No. 1

In this Issue.............

ENGLISH

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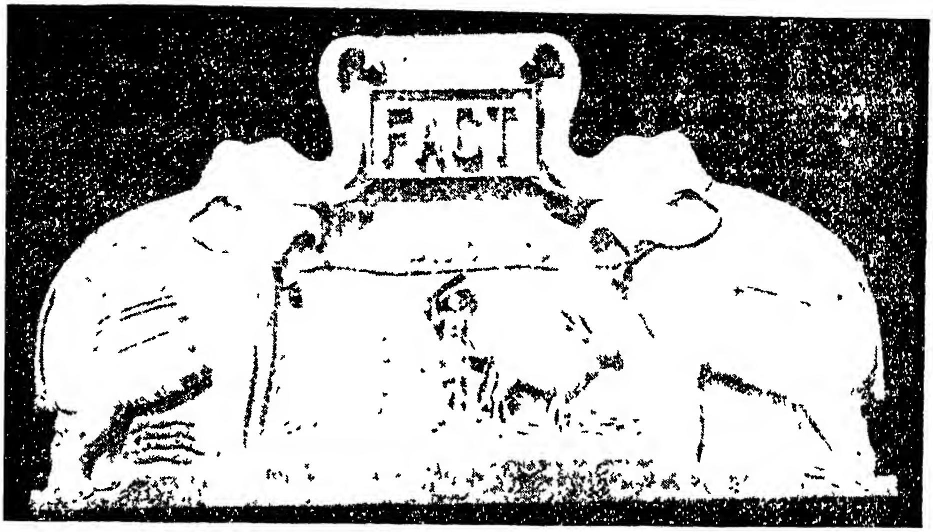
On the Cover page:

Bottom opening Skip of the Producer Gas Plant. This is worked by an overhead electric crane and is used to collect firewood from the ground and convey it to the Gas Generators.



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EDITORIAL

IT is with great pleasure that we welcome the achievement of Independence as outlined by the constitutional changes that have taken place as of August 15th. Though the terms of the constitutional changes are not fully satisfactory to all the parties in India, there is no gainsaying the fact that this is a step forward in the right direction and is a sure sign for India's progress.

As India industrialises and progresses, it is inevitable that the people of India travel to the far corners of the Earth for Commerce, Education and Pleasure travel and in these far corners of the Earth, each successive August 15th will create in them a warmth of heart and a feeling that this Nation is the personal project of all its citizens. They can look back with pride and warmth whether from political, industrial or as ambassadors of goodwill to their own achievements in creating this Nation.

In as much as our magazine is mostly devoted to the Industrial, Scientific and Agricultural progress in India, we want to view the Independence from this angle. In spite of our being optimistic, we cannot ignore the fact that India is now very much dependent on other countries for her food and

essential manufactured goods. Our Independence would be real and complete only when we are no more dependent on other countries for these items. We should attain Economical Independence. In other words, India must attain self-sufficiency in food and self-sufficiency in essential manufactured commodities.

As regards the first item, we have continually stressed in our magazine the importance of improving the methods of Agriculture. The recent statement from an official of the Food Departmemt that India's food situation is deteriorating fast and at the end of the current month the country would enter into a dangerous food period for two months ahead, is quite discouraging. We should take a lesson from this position. An all out increase in food production should be planned. Scientific methods of Agriculture should be applied using better implements and with the aid of chemical fertilisers.

The next item is Industry. There is no denying the fact that India is rich in raw materials and yet it is strange that she should be dependent on other countries for most of her requirements of manufactured goods. Till now, India's raw materials are being exported outside instead of being utilised for developing her own industries. It is no doubt true that after the second World War India is getting industrial-minded and there is a great desire among the people that India should also industrialise and come to the forefront. But unfortunately till now India was a subject nation and had to depend on the British Government's approval to her programs of industrialisation. Now that India is free to make her own plans, plans best suited for India considering the facilities available here and according to the urgent demands of her people, we should not prove lacking. A plan should be made for rapid industrialisation, first priority being given the most essential items. The untapped energy and resources of India should be tackled to her best advantage.

The first cabinet of Independent India consists of personalities who have ceaselessly worked to lift the country out of the morass of hopeless poverty. We wish them god-speed in the working out of a plan to raise India quickly to a state of economic equality with other nations.

In this connection we are glad to mention that Travancore has already adopted a forward policy in respect of scientific agriculture, chemical fertilisers and rapid industrialisation.

Editorial Board

HOW TO ACHIEVE SUCCESS IN INDUSTRY

By Dr. CHARLES OWEN BROWN

(An extract from an informal talk by the author to FACT personnel on 19th July 1947.)

I want to assure you that nothing in my entire career has given me such great pleasure, such fine satisfaction, as to be here practically as you might say at the end of the road, representing the completion of construction of this great enterprise of FACT. I really am delighted to look back to those days early in 1944 when I met with Mr. Seshasayee and Dr. K. P. P. Menon, in New York, to negotiate an arrangement and a process for the production of synthetic ammonia in Travancore. From those talks I quickly decided that people with such energy, high principles and ability were bound to win.

I have found from an inspection of the factory that the construction has been done in a very commendable manner. I suggest it will be interesting to hear later from Mr. Van Ness regarding the improvement in workmanship shown by the men as the plant progressed. I have gone over this entire plant and have been extremely well pleased at the way in which Intercontinent Corporation, the American Chemical Engineers and you men of FACT have constructed the plant. I think it is the more creditable to you generally when you consider that this plant is a modern one. Reviewing the long months of construction and the patience and energy you have all contributed so generously, I am very very sure that you are going to make a very great success of this plant.

Now we come to Operation, and here I would like to draw on my experience to give you a little advice, since you have not been operating the plant long enough to form a good basis for comments. You are on the threshold of successful operation at full capacity. I do not think you will have any serious difficulty. Plant operations consist of two important functions. *Operating*, as such, carried out by the men who produce the product; and *Maintenance* carried out by the engineers and craftsmen who keep the plant in good running condition. Both are equally important. Let us mention maintenance first. Formerly the world suffered from lack of knowledge, but today trouble arises more from the rejection of knowledge. Constant vigilence will be the price of success. It is the problem of the maintenance men to foresee the approach of trouble and correct it before any damage has taken place. It is a particularly difficult job and you could say in regard to maintenance that there is no substitute for experience. I, therefore, suggest that your experience in maintaining the plant be recorded and from these records a set of standards can be developed. You will find from experience that

some materials, some gaskets, or some valves just as examples, will give a long satisfactory life, and others will not. Of course data of this type must be recorded very carefully, and from such records standards will result. By looking back on this experience record you can look ahead to predict the proper methods of maintenance as far as practical, and keep the separate types of materials you use to the lowest possible number.

This same policy should be used in your methods of doing maintenance work, as well as with materials. Experience will reveal a superior manner of making a repair or adjustment on equipment. The method should be recorded and improved if possible in conference with a committee from the Operating Department, and then followed very carefully each time this type of work is required. With time, your list of standards will increase to cover the entire plant. These standards should be changed very slowly and then only after consideration by the Operating, Engineering and Maintenance Committees.

The plant operators are an equally important group of men whose main function is to make full production of the plant product by safe and correct operation of the equipment. One of the requirements of a good operator is a sense of organization. The quality of gas made in the gas producers will affect the synthesis plant purification and the day's production of sulphate. Any irregularity in the operation of the hydrogen or nitrogen plants is passed on to the synthesis and sulphate plants. The operating group must, therefore, work as one group. This can only be done through administration and supervision. Management makes the plans and provides the raw materials, the operators follow the plan and produce the final product. Good operators therefore may be characterized as (1) observant and alert, (2) able and willing to follow instructions, (3) if doubtful of the proper instructions, quick to ask for help, (4) when some undesirable or improper condition is detected, a good operator reports it to the foreman, who should direct what correction should be made and also notify other departments, (5) ability to work as a team unit, not as an individual alone. The work of the operators must be coordinated with all the other departments, (6) a good operator never conceals mistakes he has made and a good foreman will not censure an honest operator. Concealed mistakes can cause serious and irreparable damage while admitted mistakes can often be turned to valuable experience.

The task of an operating man is quite easy when everything is going perfectly - it is difficult to keep alert. The good operator must keep alert and in any emergency notify the foreman, and be ready to act. Most important things must come first. It is the duty of an operator to learn safe methods, and to observe all precautions and rules. No operator can afford to take a chance, each point must be thoroughly

checked and found to be correct before passing. I think that is a very fundamental principle in operation. Make doubly sure that all air for example, has been removed from the system after any repair work. Air and gas are a dangerous mixture. Similarly all other dangerous conditions must be investigated and taken care of, either by maintenance men or operators before the equipment is turned to use. Next, you must watch efficiency. We have found that about as much time is required to get a plant fully tuned up to maximum efficiency as is devoted to normal construction. Therefore you operators must be patient and keep improving.

These remarks, up to now, have been related to the Factory; now I desire to include a word of friendly council to the personnel. It is no new view point to the thoughtful person that science has economic and social consequences; what is recent is that now the public in general is sharply aware of it. In a sense you men of FACT are up on a high pedestal in full view of the people of the State. In other words, the men in business, the workers on the river, rice fields or tea estates are observing what you do here and how you react to industrial life. Your example will do much to lead others to an improved status. For your own benefit you should increase your knowledge whenever possible. The whole world has progressed by the slogan "Science is power". It is therefore important to acquire all the theoretical, as well as practical knowledge possible. This plant is, very roughly, about 40% Mechanical 35% Chemical and 25% Electrical. The course of study you can take up depends, of course, on your former education. For those with common school education, a start made by continuing in Mathematics, Algebra, Geometry with Mechanics, Chemistry or Electricity depending on the line of work desired, will be most useful. Those having some technical education in Mechanics should take courses in Steam, Power, Machine design and Metals and Alloys. Chemists with a technical education will find helpful, further studies in Thermodynamics, Gas Reactions, Physical Chemistry and Chemical calculations. All may profit by increasing their knowledge of Combustion, Flow of Fluids and Flow of Heat.

The last comment, I will mention is the subject of loyalty. As you all know the management of FACT has had a most difficult problem in building this plant due to the extraordinary additional expense caused by labor trouble in the U. S. A. We all should feel that the courage of the management deserves, as appreciation, the unquestioned loyalty of all the workers. A group of loyal workers is essential to the best success of the plant. Dissatisfied workers hurt, not only the plant record, but the welfare and progress of other loyal men. Loyalty has a personal reward. Let me tell you a story. On the compus of North-Western University in Chicago, a statue has been erected to the memory of "an average" student. This seems to us to be a praiseworthy tribute, to honor the thousands of students who did not become great athletes, who were not class officers, who failed to take high scholastic honors, but who did their very best at their assigned task everyday. It is not possible for all of us to be at the head, the number 1 man; but everyone can determine to do his very best in a loyal industrious manner.

Lime Sources in Travancore

By K. R. Krishna Iyer,
CHIEF OFFICER, MODEL SALT FACTORY, NAGERCOIL.

(An extract from the text of a talk broadcast by the auther from the Trivandrum Broadcasting Station - By kind permission of the Director, Trm. Broadcasting Stn)

THERE is hardly any chemical industry in which lime does not play a part, at some stage or other. The prosperity of many heavy chemical industries depends upon the occurrence in abundance, near enough to the factory of a source of lime. By source of lime, we mean simply workable deposits of Calcium Carbonate in any of its manifold forms. Of the various naturally occurring forms of calcium carbonate, few are absolutely pure. Among the purer varieties we may mention the beautiful, rhombohedral colorless transparent crystals of calcite or Iceland spar, which are used in optical instruments. Marble, used in statuary or as building stone is micro-crystalline and comparatively pure.

There is a small percentage of dissolved calcium carbonate present in sea-water. This is the source from which marine organisms build up their shells. These shells consist essentially of calcium carbonate. The chalk cliffs of Great Britain are composed of the minute shells of microscopic organisms. Shells of greater size may also in course of time be welded together to form solid masses of limestone. Coral reefs consist mainly of calcium carbonate built up laboriously by minute creatures. The highly valued pearl is in substance only calcium carbonate, its structure giving it its beautiful irridescent appearance.

For industrial purposes, we must rely upon extensive deposits of limestone or shells. The purity of limestone varies considerably. Specimens may contain anything between 25 and 100 per cent calcium carbonate. Shells, on the other hand, are very nearly pure. For the preparation of chemical lime only the purest limestone or shells are employed.

In Travancore, we have to rely upon the deposits of lime-shells in the backwaters for our supply of lime. Though the occurrence of limestone has been reported near Cape Comorin and in the High Ranges, east of Munnar, the deposits are either too impure or of such small extent that they are commercially unimportant.

The deposits of dead lime shells in the Vembanad and Ashtamudi lake-beds have been surveyed by Dr. J. L. Gillson. According to his estimate, the quantities available are 2¾ million tons at Vembanad and about ¾ million tons near Neendakara. Deposits also occur

near Munambam. All these together should suffice for our industrial needs for about 80 years. Besides, there are colonies of living shells which have to be carefully protected and conserved to replace the stock exploited annually.

The following are some of the outstanding uses of lime in chemical industry. Limestone is used as a flux in metallurgical processes. The lime combines with the siliceous rocky impurities forming a molten slag which flows away. Thus in the manufacture of iron, each ton of iron produced would have used up in the blast furnace about half a ton of limestone. The world's production of iron is of the order of a hundred million tons every year using up about 50 million tons of limestone during its production.

In the Portland Cement Industry, every ton of finished cement requires for its manufacture, one and a quarter tons of calcium carbonate.

Powdered limestone was formerly employed in the manufacture of soda ash by the Leblanc Process. Shell or chalk also finds use in the finely powdered form as whiting i. e. as a white pigment.

Calcium C rbonate is more often employed after it has been burnt to quick lime or calcium oxide. Quicklime, as such, is used in some industries In others, it is first slaked with water to give slaked lime and used in this condition or in the form of a suspension in water called milk of lime.

Thus glass is made by melting together lime, sand and soda-ash or potash with various other minor ingredients for varying its quality.

Lime has the power to absorb noxious gases. It is thus used in the purification of coal gas. Lime expels ammonia from ammonium salts and this property is utilised in the ammonia-soda process for the manufacure of soda ash. In this process both the lime and carbon-dioxide are utilised.

When milk of lime is boiled with soda ash, we obtain Caustic Soda. Milk of lime is employed in the manufacture of paper pulp. In the tanning industry, lime is used to remove hair from the skins. Lime also finds extensive employment in Agriculture. Lime as is well-known is used in the softening and purification of water. The most common use of lime with which we are familiar and which consumes nearly 25 per cent of all the lime that is manufactured is in the making of the common mortar for building purposes.

The process of decomposition of calcium carbonate by burning limestone or shells in lime kilns is usually carried out by ordinary workmen. But it is a process which requires skilled workmanship and technical knowledge for successful operation. We may be surprised to know that the quick lime that comes into the market is but half-burnt. 50 per cent of it is still unchanged calcium carbonate. Its effectiveness as lime, therefore, is considerably reduced. Let us give

an example. A good mortar is mixed in the proportion of 1 part lime paste to 3 parts of sand. The sand makes the mass porous and prevents shrinkage and cracking, but too much sand will weaken the mortar. If we use the above formula with our slaked lime, we are really taking ½ part lime and 3½ parts inert material–i. e. our proportion is really 1:7 and not 1 : 3 as it should be. Inefficiency and waste are much more considerable when the lime is used in a chemical industry. For example, bleaching powder made from this lime would only be about half as strong as the best commercial product.

Even simple processes, therefore have to be carefully studied and modern improved techniques employed in order to make full and proper use of our mineral resources even of lime sources.

The great importance of the proper working of our lime kilns to produce the highest quality lime would be realised if we examine the matter a little more closely.

Lime is used in the cement, glass, paper and building industries and also for agriculture and water purification. We might also mention the soda ash industry and the Caustic Soda Industry as probables in the not distant future.

The estimate of Dr. Gillson that our dead shell deposits would last for about 80 years, must have been based on the supposition that our kilns operate successfully and give fully burnt lime. If the kilns produce 50 per cent lime, the deposits may last but half the time.

An acute situation is therefore, likely to arise within the next fifty years when we shall have to look for other sources of lime to feed our industries. It is up to us, therefore, to start improving our lime-kilns and to conserve carefully and cultivate the colonies of living shells which would keep up the supply.

Last Whim and Testament

A new Hampshire man without heirs who died several years ago left two sealed letters - one to be opened by his lawyer after the funeral and one of explicit instructions for the undertaker. In accordance with the latter, the funeral took place at 4 A. M. Just four friends managed to drag themselves out at that unearthly hour. But they were well repaid for their trouble, for when the other letter was opened, it provided for the equal distribution of the man's estate - some **$400,000** - among those who attended the funeral.

Safety and the Process

(By P. B. MENON, Safety Engineer.)

IT is intended, by this article, to impress upon the minds of the employees of our factory, the extra hazards prevalent in the operation of the various plants, machinery and other equipments and the ways and means by which a good number of serious accidents, and consequent loss of time, money and even life, may be easily avoided.

Safety is a matter of mutual interest to the employee and the employer in the matter of time and money and the suffering to the injured individual and his family. Even the slightest negligence on the part of an employee in the discharge of his duties may bring forth serious consequences as loss of time, money and even life for himself and his co-workers. Mutual co-operation, elimination of carelessness and thoughtlessness together with the strict observance of Safety Rules can do a lot to prevent most accidents and the aims of safety work can thus be achieved.

In spite of the adequate safety devices present in the plant, serious accidents are likely to occur unless every man is careful at all times, as extra hazards exist in factories of this kind due to the poisonous and explosive nature of the gases and liquids which are used at very high pressure. Presence of mind in an emergency and thorough familiarity with each and every part of the equipment are the best safeguards. Old employees knowing the work and its hazards should be willing to help their new co-workers to learn their work and safety practices necessary for the protection. Every employee must strictly and religiously observe all the the Safety Rules for the protection of himself and his co-workers as well as the equipment.

Before commencing any job you must know the hazards of the job and how to avoid them. Never underestimate the hazards of any job. Be sure you are adequately protected with proper safety equipment and the equipment is in good condition to work. When you entertain the slightest doubt about the nature of a job do not attempt to do it yourself. Before commencing your work notify the Foreman-in-charge or the Plant Supdt. and obtain his permission. Protect yourself properly by attaching safety lock and tag to the witch or valve at the control point to indicate that the apparatus is under repair before starting work on any Machinery, Plant, Pipelines or Electrical equipments. When you are working inside a tank or a closed space, be sure that the interior is properly ventilated, and you are adequately protected with necessary safety equipments. No man may work

inside a tank or a Closed space without a man to guard outside.

Provide yourself with suitable clothing when you are working in the plant. Clothing which are not worn on job should be kept in the designated places, and should not be left lying around. Loose clothing is always dangerous when you are in the works, as they may get entangled in the moving machinery and endanger the wearer.

Intoxicants of any type, such as beer, wine etc. should not be brought into the works, and care must be taken to see that no means of producing flame or sparks are taken to places where inflammable materials are stored, and where explosive hazards exist.

All the materials should be kept in their designated places, and rubbish must be deposited in places specified for them. Materials should never be piled up in doorways and places where it is necessary to have an easy access in case of emergency.

Electricity can at the same time be our best friend and the worst enemy. If handled properly and carefully, we can achieve marvellous things with the help of electricity, but a careless handling of this great force means death to the person handling it, and sometimes to fellow workers too. Always use good rubber gloves and insulated tools when handling live lines. Electricians and Supervisors are to be trained for giving artificial respiration and first aid treatment for electric shock. Never play practical jokes on Electricity.

Many of the gases handled in our plant are hazardous because of their poisonous and explosive characteristics. Carbon monoxide is an extremely poisonous gas. It is colorless, odourless and tasteless and therefore not easily detectable, and extremely poisonous. Steam is one of the worst offenders for causing accidents and must at all times be guarded well. Due to high specific heat severe burns result to the skin from even short exposure. In all cases of poisoning by gases the affected person should immediately be sent to the Medical Officer.

Almost all liquids manufactured in this plant such as liquid caustic, liquid ammonia, sulphuric acid etc. are highly corrosive to the skin, and some may even cause permanent blindness. Care should be taken to wear rubber gloves and goggles while handling them. Gasoline is very dangerous. The contact of the two vessels, the friction of the swirling gasoline or the unintentional and slight friction of two nearly non-conducting substances may cause enough of a static spark to result in ignition. 'Putting some gasoline away for emergency, may be just that 'putting some away' that will cause the emergency. Avoid this practice.

In case of fire, you must immediately report to the Fire-fighting crew. It is very important that all employees should know the location

of Safety Engineer's office, Safety equipments, Dispensary, Fire-alarms, Fire-fighting equipments etc. and how and when to use them. It is your duty to assist inthe prevention of fire. Always keep combustible materials in metal-containers and in proper warehouse spots.

Working in an office is more dangerous than is commonly supposed. Crowding on stairs and at doorways, tipping back too far in the chair, taking chances with unguarded electric fans, throwing objects out of the windows, tossing burnt matches, cigerette and cigar stubs into the waste paper baskets etc. are some frequent causes of accidents in offices.

Strict observance of safety rules and mutual co-operation on the part ot employees will effectively prevent most of the accidents, and consequent loss of time, money and life, and will help to keep up the moraie of the employees.

QUESTION BOX

(IN THIS SECTION PROPER ANSWERS ARE GIVEN BY OUR SOIL AND FERTILISER EXPERT TO QUESTIONS RECEIVED FROM THE PUBLIC ON SOIL, AGRICULTURE AND USE OF FERTILISERS.)

Question No. 1.

Is it scientifically true that soils lose their productivity after a continuous application of fertilisers for a few years?

Answer:

Definitely not. Let us not forget the important fact that fertilizers contain exactly what the crops need. Successful crop production depends upon constant and intelligent use of fertilisers.

Question No. 2.

What is the optimum dosage of ammonium sulphate for plantain crop?

Answer:

The yield of the plantain crop is directly proportional to the amount of nitrogen applied to it. Each plantain tree needs not less than ¼ lb. of nitrogen for its full development. The proper dosage of ammonium sulphate for this important fruit crop is about 4 oz. per tree. The fertiliser can be applied about two or three months after planting. Another similar or half-dose can, if possible, be applied about one month before the appearance of bunch.

Question No. 3.

Which is the proper time for applying ammonium sulphate to the paddy crop?

Answer:

Ammonium sulphate is a quick acting and readily available fertilizer and so it is best applied when the crop needs it most. Normally paddy takes in most of the nitrogen it needs during the later stages of its growth and it will be wise if we apply the fertilizer just at that 'hungry' period. So it is advised that ammonium sulphate should be applied about one month after planting of paddy.

Question No. 4.

Can chemical fertilizers protect the crops against the attack of insect pests?

Answer:

Directly, cannot; but indirectly, can. When the crops are weakened by the insects a liberal dose of quick acting fertilizers, like ammonium sulphate will speed up their growth and thus enable them to stand up against the pest-attack. For instance, paddy nursery is generally attacked by various insects, like grass-hoppers, army worm, etc. and

may be completely defoliated in cases of virulent attack. In such cases a dose of nitrogenous fertilizer will make the seedlings grow up quickly and thus prevent complete loss of crop.

Question No. 5.

Which is the best time for applying ammonium sulphate to tobacco and what is the proper dose?

Answer:

Tobacco is a crop whose yield is valued more for quality than quantity. Ammonium sulphate increases the growth of the crop, thus giving longer and broader leaves. The fertilizer can be applied after the last weeding, i. e., about 30 to 40 days after planting. The soil around each plant is scooped up and fertilizer applied and covered. It must then be quickly followed by a copious irrigation. The proper dose varies according to soil conditions; but 2 cwt. of the fertilizer may be taken as the optimum dose for an acre under ordinary conditions.

Question No. 6.

Which is the most profitable method for conserving cattle manure?

Answer:

The best method is one called Loose Box System. In this method the cattle are tied loosely and floor is strewn with all kinds of litter like straw, stables and other farm waste. The dung and urine of the cattle are not removed from the bed but are absorbed and retained by the litter. The whole stuff becomes well packed as it is being trampled down by the cattle. Under this system the manure undergoes no loss of essential plant foods but care must be taken to spread litter as often as possible. It will be better if we have the shed 1½ ft. below the ground level. The manure obtained by this method will be decidedly better than those got either by merely heaping it in a pile or by dumping it in a pit.

We have read with great interest a contributed article in the EASTERN ECONOMIST dated May 23, 1947, on the subject of "IMPORT DUTY ON MACHINERY". This is a very important problem affecting the Indian industries. The article is supported by complete facts and figures showing how the import duty finally affects the poor consumer. It is also emphasised that this would also discourage the growth of industries.

We may take this opportunity to remind our readers of our Editorial article in the April-May issue entitled "A Plea For A Change in Tariff Policy."

An expeditious action is required by Government on this urgent problem.

Ed. Bd.

VALUE OF FORESTS

By The Hon'ble Sri. MADHAVA MENON,
Minister for Agriculture, The Government of Madras.

(Reproduction of the talk broadcast from the Madras centre of All India Radio—By kind Courtesy of the A. I. R., Madras)

(Continued from previous issue)

When the Forest Departments in India were first formed in the last quarter of the 19th Century they took over a depleted forest. The selection of areas for reservation had to take into account the then existing conditions in which extensive areas of forest had already been cleared and brought under cultivation by private persons or had been appropriated by them. Consequently it proved impossible to secure proper distribution of reserved forests over provinces as a whole. A glaring instance of mal-distribution of the provincial forests is that of U. P. where the forests are almost exclusively confined to the Himalayas and a narrow fringe at the foot of the Himalayas. In our own province the distribution of forests is more normal, but there are many Districts where the proportion is subnormal, as for example in Madras, Chingleput, South Arcot and Tanjore. The density and increment of the reserved forests were considerably below normal at the time of reservation and what they needed most was conservation and protection from abuse. They have been treated accordingly and a notable improvement in their condition has resulted, but they are far from being normal yet. There has indeed been a set-back as a result of the recent war fellings.

One of the common mistakes made by most people is the assumption that any injury done to a forest either by clearings, heavy fellings, burning or overgrazing is relatively easily corrected. This facile belief is based on a profound misconception of the nature of the forest or any form of wild vegetation and its intimate relation to the soil and the climate. The forest is not a change assemblage of individual species, but an organic unit whose form and composition are determined by the factors of the site, by the inter-action of the plants and animals living in it, and by the reactions of man and his domestic animals on it. Clearing, burning and over-grazing bring about a profound disturbance in the dynamic equilibrium prevailing in a climax forest. This disturbance may be and is often so serious as to make it impossible for the climax species to grow any longer on the site. This is what happens when evergreen forest is cleared or burnt; the re-growth is a throw-back to a deciduous or scrub forest and it may take centuries for the climax ever-green forest to return to the site. The succession is a long and slow process. This is the reason why we find it so difficult to rehabilitate our panchayat forests.

Considerable areas of non-timber forests were handed over in 1925 for management by village panchayats. The results have in most cases been deplorable. Over

most of the area the forest has more or less completely disappeared. It was due to the assumption that dry degraded forests which were of no importance for the production of timber or revenue could be handed over to popular management without technical control. Events have amply proved that it is precisely such areas which are most in need of technical management if it is intended to restore them to their maximum productivity. This is not to say that the immediate interests of the people should be ignored, or that they should be precluded from participation in the management of their own village forests. But forestry is a long term industry the essence of which is the principle of sustained yield; and that in meeting present demands the interests of future generations are not jeopardised. This requires a degree of vision and self-denial which it would be too much to expect of an ordinary panchayat not controlled by technical advice.

Uncontrolled clearing, burning felling and grazing have now brought into prominence an evil of national proportions. I refer to the evil of soil erosion which has been aptly called "Creeping death". Soil erosion is not a new phenomenon; some degree of erosion is inevitable, but under proper conditions the process is an imperceptibly slow one. But I think it is true to say more valuable top soil has been eroded out of our agricultural lands, waste lands and unreserves during the last fifty years than was lost during the previous 1,000 years. There are many ways of checking erosion and of remedying the damage caused by it; contour cultivation, strip cropping, check-damming, gully plugging etc., are various methods of dealing with this problem. But the cheapest, most fruitful and most durable method is to use vegetation to control erosion. Forest devastation is the ultimate cause of accelerated soil erosion and the remedy lies in a planned restoration of forest cover in our land.

We see then that our forests are the source of wood which is perhaps the most versatile raw material in the world. Our forests are also the source of various drugs and dyes and other items of minor produce. These are the direct products of our forest and are in themselves a sufficient justification for the proper care and management of the forests. It is the home of our wild animals. It is our most effective defence against soil erosion which sets in on bared slopes and carries away hundreds of thousands of tons of fertile soil every year; against the floods which drown our fields in the valleys and leave a deposit of coarse infertile soil on them; against the violence of winds and storms and sand drifts they leave in their wake; against drought and the drying of streams; against the extremes of temperature

The preservation and proper management of forests and their extension in areas where they are needed is a national duty of the first order.

Aids to Airmindedness-Economy in Air Travel

BY V. SESHASAYEE

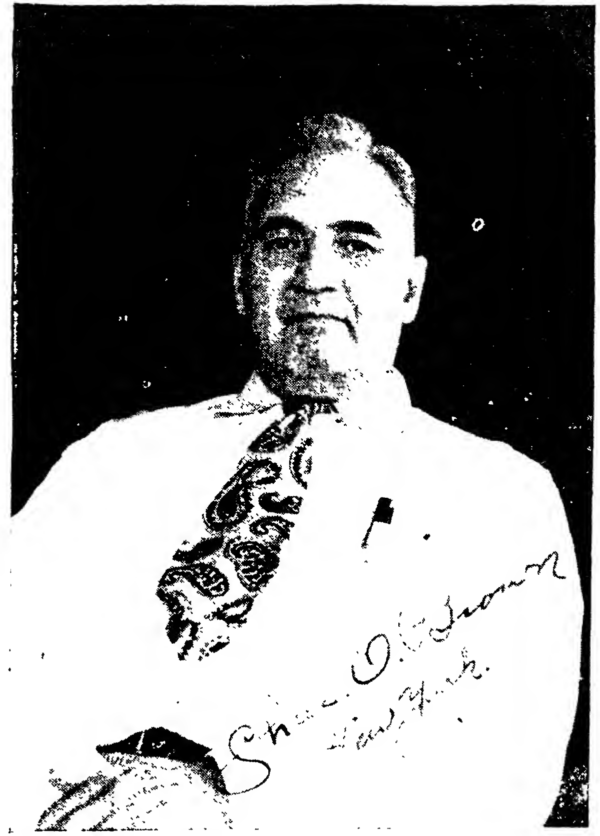
THE author of a Dictionary would define "Air-mindedness" as "capability of regarding aviation as normal, safe and necessary". Most of our youngmen and quite a number of the older generation possess this quality; for, aviation has now-a-days become part and parcel of our daily life Gone are the days when an aeroplane came to be looked upon as something unusual and wonderful. albeit risky. On the otherhand, we have come to think of flying as quite normal, easy and comfortable

This change in outlook has been due mainly to the advances achieved in this field during the war. It is probably on account of the Hurricanes and Spitfires that went zooming over practically every village in our country, that this familiarity with aircraft has come to be. Again, it is only on account of the war that we have in India a large number of planes. But for the War, the Dakota air-craft which fly over most of the Indian air lines would not have been made available. Now practically the entire air fleet of the various air lines consist mostly of army transport planes reconditioned for civilian transport. But for the impetus given by the War to manufacturers of aircraft, the advancements in the field of engine and wing design would not have been made so soon. We have seen, or at least heard of the latest entrants in the field of Jet Propulsion, and almost daily we hear of high speed planes with up-to-date Turbo Jet engines breaking previous records in speed.

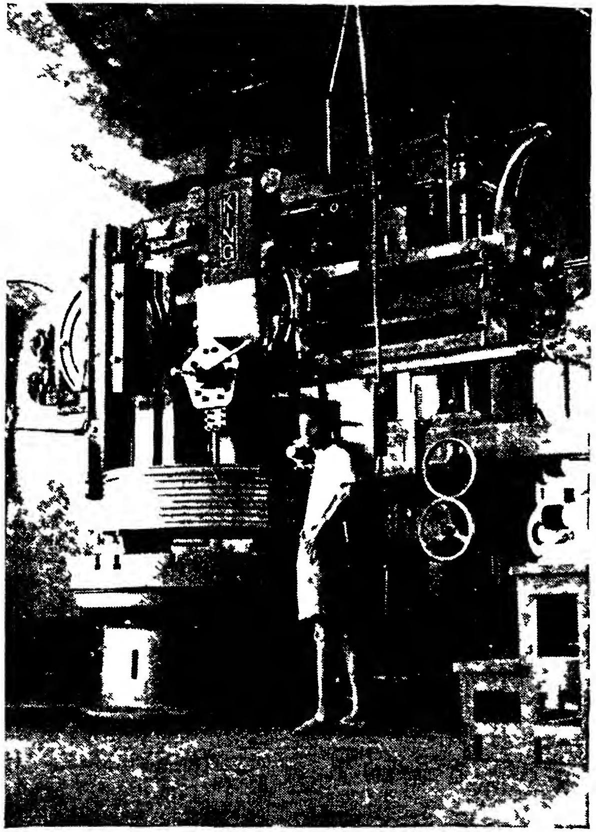
Let us now pass on to consider the facilities afforded by air travel. For the modern businessman of to-day, 10 minutes saved is 10 more minutes of busy work, possibly 10 valuable minutes which serve to close an important deal or a heavy contract. Therefore, where speed and quickness count, we cannot afford to ignore a device which helps not only from the angle of econo my and of time, but also takes you to places in comfort. I am sure this cannot be said of train journeys in our country where, to cover some 200 odd miles, one has to jog along the whole night, possibly sacrificing the night's rest completely, and arrive at the destination tired and worn out and covered with soot and dust. This presents a striking contrast to the same journey being performed by air in just under a couple of hours.

To consider the economy of air travel, it is necessary to examine fully the economies achieved under various heads by the traveller. Economy should not mean only economy in cost but also economy in energy, in time and in money. Added to this, one should reckon the physical comfort. All things

COMPANY EXECUTIVES INSPECTING THE HIGH PRESSURE PURIFICATION SYSTEM.



DR CHARLES OWEN BROWN, AMERICAN CHEMICAL ENGINEER, WHO VISITED FACT TO ADVISE ON TUNING UP THE PLANT FOR MAXIMUM PRODUCTION.



A VIEW OF THE FACT WORKSHOP SHOWING
A BORING MILL

A VIEW OF AMMONIA SYNTHESIS PLANT SHOWING
THE 1000 H P COMPRESSORS AND RECIRCULATORS.

considered, the balance is very definitely in favour of air travel. To appreciate it fully and to be able to choose, one should first know what it will cost to travel by air as compared to travel by other means of transport.

Let us take a personal trip by air on business from Madras to Delhi, Bombay or Trivandium. For the present, seating capacity of the aeroplane as well as the cost involved, makes comparison between air and railway travel possible only within a limited sphere. At the present rate of fares charged by the companies operating public air services in India, the comparison will be useful only if applied to travel in first class by rail. If we take, for instance, the trip between Madras and Bombay, the first class railway charge is Rs. 108/-; against which an air ticket from Madras to Bombay costs Rs. 135/-. The time taken for journey by rail is roughly 28 hrs. while the same by air takes roughly 5 hrs. including the road journeys involved to and from air ports.

For travel by rail we have to add expenses on food during the travel. Providing this at an average rate of Rs. 10/- per day, Rs. 15/- for the whole journey will have to be added Thus, in terms of money, air travel between Madras and Bombay costs Rs. 135/- and that by rail including food costs Rs. 123/-. If we make reasonable allowance for the time saved and reduce same in terms of money, it will readily be seen that air travel is far cheaper i.e. more economical than travel by rail first class.

Suppossing a lawyer, a Doctor or a technical expert from Bombay is engaged for services at Madras on a daily fee. The fee will range from Rs. 50- to Rs. 1000/- per day or more, and is reckoned from the time the expert, Doctor or lawyer leaves his home in Bombay to the time he returns home. It will be seen that if he travels by rail he will have to spend at least one day more in the train for each trip, single way, without being of use to the party that engages him, so that straightaway, we can conclude that for those to whom time is valuable and means money, such as doctors and lawyers, travel by air is certainly the most economical. For the quick transport of urgently needed medicines to save life and to rush critically needed things from place to place, air transport is the most economical.

In cases where, say, the operation of a big factory is interrupted or held up on account of any breakage or want of a critical machinery item, forming a vital link in the chain of production. it will be certainly most economical to have the vital part flown from wherever it is available so that the factory can be restarted with the least possible delay and minimum loss of production. Here again, the economy of air transport is obvious and unequalled.

Similarly in the case of letters and mail, it is for each person to decide whether it is more economi-

cal to send a letter by air mail or by ordinary post. In India air mail costs one anna extra over the ordinary mail for every letter of ½ oz. weight. Supposing we write a letter to some Government Department in Delhi from Trichinopoly and post it by air mail on the 1st evening, the letter will be delivered in Delhi on the 3rd morning i. e., within about 36 hrs. of despatch; whereas, the same letter sent by ordinary post will be delivered in Delhi only on the evening of the 5th i. e., at the end of about 90 hrs. Correspondence is valuable and is appreciated only if it is carried on promptly and expeditiously. Towards this end, air transport of mail offers great advantages and can therefore be considered more economical.

If we compare the relative costs of owning privately a motor car or an aeroplane it is seen that aeroplane is cheaper provided it is put to sufficient use. For private flying, it is reckoned that if a normal aircraft is used for 500 hrs. per year or more, the cost of flying works out even cheaper than a motor car. A 4-seater plane operating for 500 hrs. per year is estimated to cost not more than Rs. 20/- per hour while if the same aircraft is operated for 1000 hrs. per year, the cost comes down to Rs. 12/- per hour. The cruising speed averages between 160 and 200 miles. Even taking the lower speed of 160 miles, the charge per mile works out to As. 2 if flown for 500 hrs. per year and will be near 1¼ anna if flown for 1000 hrs. per year. If on an average 3 persons use the plane, it will be seen that it costs a little over half an anna per person per mile. This is cheaper than even the second class rail fare. You all know that a private motor car costs more than four annas per mile including all charges–petrol, oil, tyres, repairs and maintenance, garage, insurance and capital charges.

Let us look at the economics of air travel from the standpoint of the operator of air services. We cannot yet take as typical the lines now in service in India. Air services are an innovation in our country and running costs and tariffs have not been sufficiently stabilised to give us a clear picture. On the contrary, we shall consider the cost of air lines in U. S. A. where flying has been quite common, and air transportation has been well set as a stabilised industry. One can say air transportation is as much of a business as any other business, with competition, with bottlenecks, profits and losses–much the same as entertainment, agriculture, automobile, chemical or any other industry.

The vital factors that affect the economies on aircraft transportation are centred round the following:

Firstly, air transportation is a very young industry and an industry which faces exceedingly rapid technological changes. Planes that are considered "super modern" have to give place in the course of a couple of years to bigger and larger and more luxurious stratocruisers coming into vogue. Therefore the planes and other capital equipment–to use

business language–have to be depreciated at a high rate and written off in the books in five years or even less.

Secondly, the air transport industry has to bear a very high standing charge compared to other industries. These standing charges are as much as 2/3 (66·6%) of total costs.

These two factors place a very serious handicap in the way of the development of air lives, and a good deal of leveling out of fluctuations of income due to varying passenger traffic is necessary, as also a fair amount of Government subsidy, to make it worth while for the air line operators to carry on their business. Besides this, there is always the problem of competition between air lines themselves. Fortunately in India today, this problem has not seriously developed because the business is still young and has not become so highly developed as to necessitate "selling" it to the prospective passenger. Government subsidy often comes mostly in the shape of air mail and air express freights. Large numbers of aerodromes and hangars constructed at enormous cost and available at a nominal rent near most of the very big cities in our country, have contributed greatly to the development of air services. And the development of air services is very essential for cutting down distances in a vast country like ours. Being a sub–continent, we have particular need for an efficient air service.

Really speaking it is the duty of every Government to subsidise and encourage air lines since this mode of transport offers economies both to Government and to the passengers. For instance, the necessity for maintaining costly highways and arterial roads is reduced and thus offers them a substantial economy. As against this only a few weather stations and observatories have to be set up to supply weather forecasts.

There can be no doubt as to the economy of air travel over the other modes of locomotion and my foregoing discussion for the past few minutes, I hope, gives sufficient data for one to appreciate this economy.

It should not be concluded from the foregoing that air travel will eventually become so economical that it will be used in place of all other forms of transport. Land and water transport have their own advantages and are economical in their own way.

I have all along been discussing aviation from an economic angle– but we should not forget at the same time the social and human view points. The development of air lines should be of fundamental importance to our country, especially now when we are launching on a glorious era of advancement.

An extract from the text of a talk recently broadcast by the author from Trichinopoly—By kind permission of A. I. R., Trichy.

AVIATION NEWS OF IMPORTANCE

INDIAN NATIONAL AIR-WAYS.

In the Air Transport world, a reputation for safe, speedy, comfortable and economical flying cannot be gained overnight. Formed in May, 1933, Indian National Airways have constantly and enthusiastically endeavoured to popularize air-travel and prove that it pays to fly in India. The reputation of this Company stands among the best in the world.

The development of internal routes; the operation of tributary services to the Empire route and the participation in the formation of Indian Trans-Continental Airways, the Indian Company operating the trans-Indian Air-route in conjunction with Imperial Airways: these were the primary objects behind the formation of Indian National Airways.

The first regular Air Mail and Passenger services were inaugurated on 1st December, 1933, Calcutta, Dacca and Rangoon, among other places, were serviced. Charter aircraft were also maintained in Calcutta.

In 1934, I. N. A. established a flying school in Rangoon. During the same year, regular and charter operations were commenced in Northern India. The Karachi–Lahore service was maintained and developed with excellent efficiency.

From the very inception of the company, their planes and personnel have whole-heartedly co-operated in the rendering of humane services in the countries, numerous ravages of Flood, Fire, Riot, Earthquake and Famine. Valuable assistance was also rendered to the R. A. F. and R. I. A. F. during the war. I. N. A. planes operated to the last in the evacuation of Burma in 1942.

The towns and cities linked by the famous 'Indiaman' services are: Calcutta, Allahabad, Cawnpore, Lucknow, Delhi, Lahore, Quetta, Karachi, Jodhpur, Rawalpindi and Peshawar.

In a week, I. N. A. fly 37,500 miles (260 hours) carrying well over 600 passengers and 13,000 pounds of freight. Compared with the statistics of even three years ago, these figures focus trenchantly the extent to which detailed attention at all times to the countries needs of quick transportation has repaid and is repaying months and year of planning.

AIR ROUTES IN INDIA.

Fifteen air routes operated in India as of the end of 1946, totalling 11,600 miles. Plans call for development of system to over 20,000 miles by 1948.

AIR TRAFFIC CONTROL IN INDIA.

The Civil Aviation Directorate of India has taken over the control of all air traffic in India from Air Headquarters (G. H. Q.) India. For purposes of air traffic control in future, the country has been divided

into five regional air centres for administrative purposes, namely, Delhi, Karachi, Bombay, Madras and Calcutta. Each regional centre has been placed in charge of an officer with the designation of Regional Aerodrome Officer who will be assisted in his duties by local aerodrome officers of the units under his administrative charge. Wing Commander A. T. S. Willis, who has been appointed as Chief Air Traffic Controller for India will advise on all matters relating to the building up of area control of the entire aviation system in India.

AIR-CONDITIONING PLANT TO BE INSTALLED.

It is understood that plans for installing air-conditioning plant in aerodromes in India will be finalised shortly.

The air-conditioning plant, which will cost about Rs. 1,25,000 each, will be installed at all aerodromes for cooling land as well as sea planes before they take off. The plant, which can pump 3,000 cubic feet of cool dried air per minute, are fitted on lorries and can be moved about from place to place. Other uses for these plants will be the air-conditioning of hospitals and schools. They are expected to arrive in India during the next six months.

REFUELLING PLANES IN THE AIR.

Britain's experiments with refuelling aircraft in the air have shown themselves successful in the case of practical aviation.

At the end of May this year, the first aircraft flew nonstop from London to Bermuda, returning the following day under the same conditions. On both the outward and the homeward journey, it refuelled over the Azores, the operation being carried out without difficulty or incident.

STRATOCRUISER'S FIRST TEST FLIGHT.

The 67½ ton Boeing Stratocruiser, the world's largest and fastest post-war airliner, completed its first test flight over Seattle and Company, officials pronounced it highly successful.

The huge torpedo-shaped plane remained aloft for one hour and twenty-four minutes with a gross take-off weight of 100,000 pounds, 35,000 less than the maximum gross.

The plane has a crusing speed of approximately 340 miles per hour but test pilot, John Fornasero, said he flew at about 260 miles per hour. He said he reached an 11,000 foot altitude in what he described as an 'uneventful and highly satisfactory flight' He said the craft only used 1,400 feet of the runway in becoming airborne and came to a stop in 1,200 feet after landing.

The Stratocruiser has a double-deck construction. On the upper deck 80 passengers can be accommodated, while there are three lounge and cargo compartments on the lower deck. Each passenger has approximately 61 cubic feet of space, officials said.

When it enters the world-wide commercial service later in the year, the airliner will bring a new standard of comfort, speed and operating efficiency to the Air-wars. The craft will be capable of flying to Stockholm from New York in 12½ hours, from Tokyo to Seattle in 16½ hours and from Honolulu to San Francisco in 8 hours, while the San Francisco to New York flight would be made in 8½ hours.

NEWS & NOTES............in brief

COAL DEPOSITS NEAR CUDDALORE

It is understood that the Geological Survey of India have discovered a rich repository of lignite coal in the area covered by Vriddhachalam and Cuddalore. For the last three years it seems boring operations were being carried on near abouts Neyveli, a place between Vriddhachalam and Cuddalore. These operations were undertaken in connection with the digging of artesian wells for purposes of water supply under orders from the Industries Department of the Government of Madras.

As work was progressing, it appears, in some of the boreholes, a small coal-like substance was found. However, the finding did not rouse further interest until the Binny and Company undertook to make more bore-holes in the area.

During the war, the Government of Madras, realising the great potentialities of these findings, suggested to the Geological Survey Department that they may focus their attention to these. The Department, accordingly, made arrangements to supervise the boring operations. Soon, about twenty bore-holes were made and now a thick seam of lignite coal has been found in all these twenty bore-holes.

The Coal Commission, which recently made an investigational tour of the country in its report made but a passing reference to the presence of coal mines in the Vriddhachalam-Cuddalore area. Recently, however, the Coal Commission has appreciated the situation better and has deputed a Mining Engineer to make a study of the developments.

It is understood that the coal deposits cover a fairly extensive area of this region. At the present moment, however, the bore-holes made for experimental purposes cover about ten square miles.

NEW SUGAR FACTORY FOR MYSORE

It is understood that on representation by the Mysore Government, the India Government has allotted one new unit of Sugar Factory for Mysore and the question of its location is under the consideration of the Government.

EXTENSION OF PADDY CROP IN TRAVANCORE

The Travancore Government have launched a programme which would cultivate at least seven thousand acres of land in North Travancore producing five lakhs of parahs of additional paddy.

The Government have sanctioned the formation of a temporary irrigation sub-division for the purpose of investigation and execution of irrigation schemes in the Parur and

Kunnathunad Taluks in North Travancore. It is estimated that this scheme when completed will make water available to an area of 7000 acres of land for the next 'Makaram Crop'.

DREDGERS FOR TRAVANCORE GOVERNMENT

It is understood that the Travancore Government have purchased eight dredgers from America. Two of these have already been received and assembled and the other six are en-route. These dredgers are meant to deepen the rivers and canals in the State with a view to improving the navigational facilities within the State. It may be of interest to readers to note that water transport plays a very important part in the Travancore State for the movement of materials from one place to another. In the monsoon, due to the floods in the rivers, lot of silt is carried and deposited on the beds as a result of which in the summer when there is not much water in the rivers, the rivers are too shallow and do not allow movement of heavy traffic in the river. These dredgers would go a long way in solving this problem.

FERTILISERS INCREASE COTTON PRODUCTION

Some indication of the strenuous efforts made by American farmers to increase cotton production is provided by the fact that fertiliser sales have been unusually heavy this year in the U. S. The National Fertiliser Association pointed out that actual distribution of fertilisers rose to 644,000 tons during May, 1947, which is 34 per cent already that in May last year.

THE INDIAN TARIFF BOARD

According to a press communique issued by the Indian Tariff Board, it has concluded the inquiry into the Stearic Acid and Oleic Acid Industries. This brings the total number of wartime industries on which inquiries have been concluded to thirty-five out of the forty-eight wartime industries so far referred to the Board.

In addition to the reports on twenty-seven industries already submitted to Government by the middle of April, 1947, the Board has since submitted to Government reports on six more industries, namely: (1) Machine Tools, (2) Electric Motors, (3) Plywood and Tea-chests, (4) Ferro-silicon, (5) Alloy, Tool and Special Steels and (6) Dry Batteries. Report on the Oleic Acid and Stearic Acid Industries is expected to be submitted to Government shortly.

By the middle of April, 1947, Government had passed orders on fifteen of the Tariff Board's reports. Orders have since been passed on two more industries, namely (i) Grinding Wheels and (ii) Preserved Fruits.

RECENT ADVANCES IN U. S. MACHINE TOOLS

Top industrial executives of the entire world are expected to attend

the fourth Machine Tool Show, to be held in Chicago, Illinois, U. S. A., from 17th to 20th September this year, at which recent advances made in design and performance of the American Industry's master-tools will be exhibited and demonstrated.

There are some 250 types of machine tools made in the United States, with many variations and sizes of each type and combinations of various types, particularly along the line of special purpose machines designed for mass production techniques. In addition to these, the show will contain forging machines and various other sorts of metal working equipment, tools appliances, materials and accessories, and miscellaneous varieties of exhibits relating to machine tools. As the show will be housed not in an exhibition hall but in an actual industrial plant, approximately 12,000 horsepower will be available for demonstrating machines in actual operation. The plant has floors capable of supporting the heaviest loads required and it has all the other facilities required for the operation of machine tools under working conditions. Concurrently with the show, the Machine Tool Congress will hold nightly sessions devoted to the presentation, by foremost authorities, of papers covering the many outstanding new developments in metal working technique and processes.

CONTINUOUS SOAP PRODUCTION

"Chemical Engineering" has reported a process developed by the Proctor and Gamble Co., U. S. A. for continuous production of soap in a few hours' time. Advantages claimed for the process are those of time saving, space saving, improved colour of soap, improved glycerine recovery, increased flexibility of operation and reduced quantity of materials tied up in process. The conventional process of soap making which takes about 15 days to turn raw materials into a finished soap may be replaced by this modern process which takes only 24 hours for the same job.

Continuous counter current hydrolysis under pressure and at high temperature with a catalyst, followed by continuous distillation, neutralization and finishing are the principal operations involved. The mixture of fats in the requisite proportions reacts with water to split into fatty acid and glycerine. The fatty acid is purified by distillation and then neutralized. The resulting 'neet soap" may be finished into any of the usual products. The by-product glycerine is concentrated in a multiple effect evaporator which is synchronised with the fatty acid production.

FALL IN SOAP PRODUCTION

The sixty per cent cut in the supply of caustic soda to manufacturers has seriously curtailed Indian soap production which is already far below capacity. Since reaching peak production of 145,000 tons in 1945, output of soap has fallen off rapidly due to successive cuts in caustic soda quotas. Present production of about 75,000 tons per annum may decline still further in view of the latest restriction on caustic soda supplies.

FACTS THAT INTEREST

SYNTHESIS OF FIBROUS PROTEINS.

The first successful synthesis of fibrous proteins–human "building blocks" that make skin, hair, nails and other structural material of the body–has been reported by an American Scientist.

A young Harvard Scientist may put the silkworm out of business as a silk producer. It may put sheep out of business as a wool producer. It may also put the mink, squirrel and beaver out of business for fur producers.

Such speculation arose as Robert Woodward, Associate Professor of Chemistry at Harvard University, reported his discovery in the Journal of the American Chemical Society. The discovery also may result in development of new and more powerful germ-killing compounds.

Woodward reported that he had been able to synthesise substances having general molecular structural characteristics identical with fibrous proteins. The proteins, basically, are composed of amino acids and are necessary for life. They are human-building blocks. Their natural sources include such foods as meat, cheese and milk.

In developing the new process, Woodward reported that he had been able to tie together long chains of amino acids into large molecules resembling the structure of nature's own protein molecules. In addition, he is able to make chains of molecules. These protein molecules, which are formed of atoms such as nitrogen and carbon, may be described as a long freight train, with each particular car in its correct position. It is the order in which the molecules are arranged that make up a certain substance, such as fibrous protein.

Protein molecules with 10,000 or more units already have been made and Woodward believes that giant molecules of more than 100,000 units, such as those found in nature, can be produced. This would open new approaches in areas of biology, medicine and plastics sciences.

With man able to synthesise hair or strands of silk or wool, revolutionary changes may occur in the textile and fur industries. Woodward also reported that he had produced thin transparent film with his new substances–an indication that it may have great bearing on the plastics industry.

CURE FOR LEPROSY.

According to a news published in the latest British Medical Journal, Sulphones, which are the drugs usually used for the treatment of Tuberculosis, have proved more useful in the treatment of leprosy. It is said that all over the world experienced workers who have carried

out initial trials with the drugs have without exception obtained favourable results.

PRODUCTION OF MANGANESE.

A new process, which will enable India to extract manganese directly out of her own stocks of manganese ore, of which she is the second biggest producer in the world, is described in the March issue of the Journal of Scientific and Industrial Research. The process, which is worked out in the laboratories of the Indian Standard Metal Company Limited, Bombay enables the extraction of the metal from ores and also electrolysis of Aqueous solutions to produce pure manganese.

Pilot plants for the reduction of low grade ore and subsequent electrolysis of manganous sulphate have been perfected. The process has been successfully worked out on a pilot plant scale with an output of 50 lbs. of manganese per day. Samples of electrolytic manganese produced by this process have been spectrographically analysed and found to be free from sulphur, cadmium, silver, antimony, lead, aluminium and arsenic. They contain however, traces of nickel, iron and tin.

In view of the extensive deposits of the manganese ores occurring in India, manufacture of manganese by electro-deposition is of great economic importance to the country.

PENCILLIN FOR TREATMENT OF SYPHILIS.

A two year old study in America of Penicillin treatment of syphilis has indicated that it gives "satisfactory" results in 75 per cent of the cases treated.

COLOUR TELEVISION.

At RCA Laboratories, Princeton, N. J., the Radio Corporation of America has very recently demonstrated publicly for the first time, electronic colour television pictures, produced by all-electronic means. This demonstration, it is stated, has revealed a revolutionary development in radio science and proved that flickerless, all electronic colour television is practical without rotating discs or other moving parts. It is also stated that this new system is a complete departure from mechanical colour, shown in various forms since 1925 and that a simple inexpensive radio-frequency converter makes it possible to introduce this all-electronic colour television system without causing obsolescence of black-and-white television receivers.

VALUABLE CEREAL HYBRIDS.

It has been announced in Moscow that Soviet Botanists have tackled the task of evolving grains which can be cultivated on arid and even saline soils in desert or steppe. Their method is to cross cultivated plants with wild ones and already many valuable hybrids have been developed by crossing wheat and rye with weeds such as couch grass.

WORLD'S SMALLEST AUTOMOBILE.

Hiroshi Tamura, former President of Sankokn Heavy Industries

Company of Japan has designed and manufactured a small automobile said to be one of the world's smallest automobiles. It weighs about 50 lbs. and can carry one person at a speed up to 17 miles per hour. It is powered by a 1·5 horse-power engine and its cost is estimated at 10,000 yen. (Equal to Rs. 650)

NEW "HAPPINESS" DRUG.

A new 'happiness' drug called 'Synhexyl' has been produced by British Scientists and has been already used with Striking success in the treatment of people suffering from depression and anxiety. Synhexyl is said to produce a sense of relief from anxiety, zest for life and a feeling of happiness and exhilaration with a marked sense of self-confidence.

GADGETS FOR TESTING VEGETABLES.

Dr. I. C. Hant, Head of the Horticulture Department of the University of Maryland, has disclosed that a "succulometer" and a "tenderometer", to test the tastability of vegetables, have been developed in university laboratories. These mechanically precise instruments are designed to be used by farmers in determining when vegetables are ready to be picked. The "tenderometer", it is said, shows when green peas reach their scientific peak of ripeness by registering the amount of pressure it takes for the instrument to sheer through a sample pod. The 'succulometer' measures the moisture content of growing corn (maize), and the test is said to be a very good index as to when it is ready for picking. The mechanism eliminates the factor of human error.

THREE—DIMENSIONAL PHOTOGRAPHY.

A startling new process in three-dimensional photography has very recently been invented by M. Maurice Bonnet. Studios are now being set up in London where members of the public—at a rather high cost—have their photographs taken by this new process which is expected to have wide application. It is claimed that the 'deep pictures' obtained by this new system will be of great value to doctors and surgeons, particularly in the development of X-ray photography.

SYNTHETIC BLOOD PLASMA.

It is now revealed that a synthetic blood plasma—made from a mineral with the properties of limestone and coke—has saved thousands of German lives during the war. Chemical records acquired by American investigating teams in Germany have shown that the Germans used the above drug as a plasma substitute in transfusions and operations on 40,000 patients.

NEW EXPERIMENT, WITH RADIO-ACTIVE CARBON, FOR PRODUCING SWEETER FRUITS.

An experiment with radio-active carbon, leading to speculation that orange trees with sweeter oranges, apple tree with sweeter apples and tomato vines with better tomatoes may be forthcoming by a scientific miracle, has been made, at the University of California, by four Californian Scientists, Drs S. Aronoff, A. Benson, W. Haissed and M. Calvin. The important significance of this experiment, it is said, is that it leads one to believe that plants without too much roots can use more carbon dioxide from the air to make more sugar with which it can sweeten the fruit.

എഴുത്തുപെട്ടി.

ചോദ്യം—നമ്പർ 1:—

ഏതാനും സംവത്സരങ്ങളിൽ തുടർച്ചയായി ശാസ്ത്രീയവളം ഉപയോഗിക്കുന്നതിനാൽ, മണ്ണിന്റെ ഉല്പാദനശക്തി കുറഞ്ഞുപോകുമെന്നതു് ശാസ്ത്രദൃഷ്ട്യാ ശരിയാണോ?

ഉത്തരം:—

നിശ്ചയമായും അല്ല. വിളവുകൾക്കു് അവശ്യം ആവശ്യമായ പോഷകവസ്തുക്കളെല്ലാം ശാസ്ത്രീയവളങ്ങളിൽ അടങ്ങിയിരിക്കുന്നുവെന്ന വസ്തുത നാം വിസ്മരിക്കരുതു്. അതിനാൽ വിജയകരമായ കാർഷികോല്പാദനം നിരന്തരവും ബുദ്ധിപൂർവ്വവുമായ വിധത്തിൽ വളങ്ങൾ ഉപയോഗിക്കുന്നതിനെ ആശ്രയിച്ചിരിക്കുന്നു.

ചോദ്യം—നമ്പർ 2:—

വാഴക്കൃഷിക്കു ചേർക്കേണ്ട അമോണിയം സൾഫേറ്റുവളത്തിന്റെ ക്ലിപ്തമായ അളവെത്രയാണു്?

ഉത്തരം:—

വാഴച്ചെടിക്കു കിട്ടുന്ന പാക്യജനകത്തിന്റെ (അഥവാ നൈത്രജനകത്തിന്റെ) (Nitrogen) അളവനുസരിച്ചാണു് അതിൽ ഫലമുണ്ടാകുന്നതു്. ഓരോ വാഴയ്ക്കും അതിന്റെ പരിപൂർണ്ണമായ വളർച്ചക്കു് ¼ റാത്തലിൽ കുറയാതെ പാക്യജനകം ആവശ്യമാണു്. അതിപ്രധാനമായ ഈ കൃഷിക്കു് ചേർക്കേണ്ട അമോണിയംസൾഫേറ്റുവളത്തിന്റെ ശരിയായ അളവു് വൃക്ഷമൊന്നുക്കു് ഏകദേശം 4 ഔൺസ് വീതമാണു്. വാഴ നട്ടതിനു രണ്ടോ മൂന്നോ മാസങ്ങൾക്കുശേഷം വളം ഉപയോഗിക്കാവുന്നതാകുന്നു. കായ്ക്കുലയുടെ ആവിർഭാവത്തിനു് ഏകദേശം ഒരു മാസത്തിനുമുമ്പു്, വീണ്ടും നാലോ അല്ലെങ്കിൽ രണ്ടോ ഔൺസ് വളംകൂടി ചേർക്കുവാൻ സാധിക്കുമെങ്കിൽ നന്നായിരിക്കും.

ചോദ്യം—നമ്പർ 3:—

നെൽകൃഷിക്കു് അമോണിയംസൾഫേറ്റു് ചേർക്കുന്നതിനു ശരിയായ സമയമേതാണു്?

ഉത്തരം:—

വേഗത്തിൽ ഫലം കാണിക്കുന്നതും കിട്ടുവാൻ എളുപ്പമായതും ആയ ഒരു വളമാണു് അമോണിയംസൾഫേറ്റു്. അതിനാൽ ചെടിക്കു് അതു് അത്യാവശ്യമാകുന്ന അവസരമാണു്, അതുപയോഗിക്കുവാൻ ഏറ്റവും നല്ല സമയം. നെൽച്ചെടി അതിനാവശ്യമുള്ള പാക്യജനകത്തിൽ അധികഭാഗവും സംഭരിക്കുന്നതു് അതിന്റെ വളർച്ചയുടെ അന്ത്യഘട്ടങ്ങളിലാണു്. അതിനാൽ ആ 'വിശപ്പ്' കാലത്തുതന്നെ വളം ചേർക്കുന്നതു് ബുദ്ധിപൂർവ്വകമായിരിക്കും. നെൽച്ചെടി നട്ടതിനു് ഏകദേശം ഒരു മാസത്തിനുശേഷം അമോണിയം സൾഫേറ്റു് ചേർക്കേണ്ടതാണെന്നു് ഇവിടെ പ്രസ്താവിക്കുന്നതു് ഉചിതമായിരിക്കും.

ചോദ്യം—നമ്പർ 4:—

ക്ഷുദ്രജീവികളുടെ ആക്രമണോപദ്രവങ്ങളിൽനിന്നും ചെടികളെ രക്ഷിക്കുവാൻ ശാസ്ത്രീയവളങ്ങൾക്കു ശക്തിയുണ്ടോ?

ഉത്തരം:—

പ്രത്യക്ഷത്തിൽ ഇല്ല. പക്ഷേ, മറ്റുവിധത്തിൽ ശക്തിയുണ്ടു്. വിളവുകളുടെ ആരോഗ്യം ക്ഷുദ്രജീവികളാൽ നശിപ്പിക്കപ്പെട്ടപ്പോൾ, അമോണിയം സൾഫേറ്റുപോലെയുള്ള ഒരു നല്ല ശാസ്ത്രീയവളം വേണ്ട പ്രകാരത്തിൽ അവയ്ക്കു ചേർത്തുകൊടുക്കുന്നതു്, അവ വേഗത്തിൽ തഴച്ചു വളരുന്നതിനും ക്ഷുദ്രജീവികളുടെ ആക്രമണത്തെ ചെറുത്തുനില്ക്കുവാൻ അവയ്ക്കു് സാദ്ധ്യമാകുന്നതിനും ഹേതുവായിത്തീരുന്നു. ഉദാഹരണമായി, ചാഴി, വിട്ടിലുകൾ മുതലായ കീടങ്ങൾ, നെൽച്ചെടികളെ സാധാരണയായി ആക്രമിക്കുന്നു. ഈ ആക്രമണത്തിന്റെ ശക്തി വർദ്ധിക്കുമ്പോൾ ആ ചെടികൾ നിശ്ശേഷം നശിക്കുകയും ചെയ്യുന്നു. ഇത്തരം സന്ദർഭങ്ങളിൽ, പാക്യജനകാത്മകമായ വളം ഉപയോഗിക്കുന്നതായാൽ, ആ പിഞ്ചുസസ്യങ്ങൾ വളരെ വേഗത്തിൽ വളരുന്നതും വിളവിന്റെ നാശം തടയപ്പെടുന്നതുമാകുന്നു.

ചോദ്യം—നമ്പർ 5:—

പുകയിലകൃഷിക്ക് അമോണിയം സൾഫേറ്റ് ചേർക്കേണ്ട ഏററവും നല്ല സമയമേതാണ്? ശരിയായ വീതമെത്രയാണ്?

ഉത്തരം:—

"തൂക്ക"ത്തെക്കാൾ "ഗുണ"ത്തിന് കൂടുതൽ പ്രാധാന്യവും വിലയുമുള്ള ഒരു വിളവാണ് പുകയില. അമോണിയം സൾഫേറ്റ് പുകയിലച്ചെടികളുടെ വളർച്ചയെ വർദ്ധിപ്പിക്കുകയും അവയുടെ ഇലകൾക്ക് കൂടുതൽ നീളവും വീതിയും ഉണ്ടാക്കുകയും ചെയ്യുന്നു. അവസാനത്തെ കിളപറിപ്പിനുശേഷം—അതായത്, നട്ടതിന്റെ ഏകദേശം 30-40 ദിവസങ്ങൾക്കുശേഷം വളം ചേർക്കാവുന്നതാണ്. ഓരോ ചെടിയുടേയും ചുററുമുള്ള മണ്ണ് വെട്ടിയിളക്കി തടമെടുത്ത് വളം ചേർത്തു മൂടിയതിനു ശേഷം, ഉടൻതന്നെ നല്ലവണ്ണം ജലസേചനം ചെയ്യേണ്ടതാണ്.

മണ്ണിന്റെ സ്ഥിതിയ്ക്കനുസരിച്ചാണ് വളം ചേർക്കേണ്ടതിന്റെ ശരിയായ വീതക്രമം നിശ്ചയിക്കുന്നത്. പക്ഷെ, സാധാരണ സ്ഥിതിഗതികളിൽ ഏക്കറൊന്നിന് 2 ശതത്തൂക്കം (224 റാത്തൽ) അമോണിയം സൾഫേറ്റ് ചേർക്കാവുന്നതാണ്.

ചോദ്യം—നമ്പർ 6:-

കന്നുകാലിവളം സംഭരിക്കുന്നതിന് ഏററവും ആദായകരമായ മാർഗ്ഗമെന്ത്?

ഉത്തരം:—

ഏററവും നല്ല സമ്പ്രദായം കണ്ടുവളനിർമ്മാണരീതി (Loose Box System) എന്നറിയപ്പെടുന്നതാകുന്നു. ഈ സമ്പ്രദായപ്രകാരം കന്നുകാലികളെ തൊഴുത്തിൽ വലിച്ചുകെട്ടുന്നില്ല; അവയ്ക്ക് അതിനകത്തു യഥേഷ്ടം നടക്കുന്നതിനുള്ള സൌകര്യം കൊടുക്കുന്നു. എന്നുമാത്രമല്ല, തൊഴുത്തിന്റെ നിലത്തു മുഴുവനും വയ്ക്കോൽ, പുല്ല്, പച്ചില എന്നു തുടങ്ങിയ എല്ലാ തരം 'ചപ്പുചവറു'കളും വിതറുകയും ചെയ്യുന്നു. കന്നുകാലികളുടെ ചാണകവും മൂത്രവും, തൊഴുത്തിൽതന്നെ കിടക്കുന്നതിനാൽ, അവ തൊഴുത്തിലുള്ള 'ചപ്പുചവറു'കളുമായി ദ്രവിച്ചുചേരുന്നു; കൂടാതെ കന്നുകാലികളുടെ നിരന്തരമായ ചവിട്ടേററ് അതു മുഴുവനും നല്ലവണ്ണം ചതഞ്ഞു മെതിയ്ക്കപ്പെടുന്നു. ഇപ്രകാരം ഉണ്ടാകുന്ന വളത്തിൽ സസ്യങ്ങൾക്കു വേണ്ടതായ ആഹാരാംശങ്ങൾ ധാരാളമായിട്ടുണ്ടായിരിക്കും. പക്ഷെ തൊഴുത്തിൽ അപ്പോഴപ്പോൾ 'ചപ്പുചവറു'കൾ വിതറേണ്ട വിഷയത്തിൽ പ്രത്യേകം ശ്രദ്ധപതിയ്ക്കേണ്ടതാണ്. നിലനിരപ്പിൽനിന്നും $1\frac{1}{2}$ അടി താഴ്ചയിൽ തൊഴുത്തു നിർമ്മിയ്ക്കുന്നതായിരിക്കും നല്ലതെന്നു പറയേണ്ടിയിരിക്കുന്നു. ഇപ്രകാരം ലഭിക്കുന്ന വളം "കന്നാ"യിക്കൂട്ടിയോ കുഴിയിലിട്ടു നിറച്ചോ ഉണ്ടാക്കുന്ന വളങ്ങളേക്കാൾ കൂടുതൽ സമ്പുഷ്ടിയുള്ളതായിരിക്കുമെന്നതു നിശ്ചയമാണ്.

അതിന്റെ കാര്യം!

ഗുരുനാഥൻ:— (വിദ്യാർത്ഥികളോട്) നിങ്ങളെപ്പോലെ ഒരുക്കൂട്ടം മടയന്മാരെ ഞാൻ ഇതുവരെ കണ്ടിട്ടില്ല. ഒരുക്കൂട്ടം മണ്ടന്മാർ! ഈ കഴുതകളെ പഠിപ്പിക്കുവാൻ എനിക്കു യോഗം വന്നല്ലോ, ഈശ്വരാ! ഞങ്ങളെല്ലാം പഠിക്കുമ്പോൾ എന്തായിരുന്നു കഥ? എന്തൊരു അനുസരണശീലം! മാസ്റ്റർ പറയുന്നതെല്ലാം അന്നന്നു പഠിക്കുക പതിവായിരുന്നു.

സരസനായ വിദ്യാർത്ഥി:— സാർ, അതിനൊരു കാര്യമുണ്ട്. അന്നു സാറിനെ പഠിപ്പിച്ച മാസ്റ്ററല്ല ഇന്നു ഞങ്ങളെ പഠിപ്പിക്കുന്നത്. അതുകൂടി ഓർമ്മവേണം!........

വൃത്താന്തസംഗ്രഹം.

കരിമ്പുകൃഷി വർദ്ധിപ്പിയ്ക്കുന്നതിനുള്ള പദ്ധതി.

സംസ്ഥാനത്തിലുള്ള പഞ്ചസാരനിർമ്മാണക്കമ്പനികളുടെ ആവശ്യങ്ങളെ പരിഗണിച്ച് നിലവിലുള്ള കരിമ്പുകൃഷി വിപുലീകരിക്കുവാൻ, മദിരാശി ഗവർമ്മെൻറ് ഒരു പദ്ധതി തയ്യാറാക്കി വരുന്നതായറിയുന്നു.

ബാംഗ്ളൂരിൽ പുതിയ പ്ലാസ്റ്റിക്കമ്പനി.

ബാംഗ്ളൂരിൽ അടുത്തുതന്നെ ഒരു പ്ലാസ്റ്റിക് കമ്പനി സ്ഥാപിയ്ക്കപ്പെടുന്നതായിരിയ്ക്കുമെന്ന് അറിയപ്പെടുന്നു. ഇരുപത്തിഅഞ്ചു ലക്ഷം രൂപായുടെ ചിലവ് ഉൾക്കൊള്ളുന്ന ഒരു പദ്ധതി ഇതിലേയ്ക്കായി മൈസൂർ ഗവർമ്മെൻറ് അനുവദിച്ചുകഴിഞ്ഞിട്ടുണ്ട്. ഈ കമ്പനിയിൽ വിവിധങ്ങളായ 'പ്ലാസ്റ്റിക്' വസ്തുക്കൾ നിർമ്മിയ്ക്കപ്പെടുന്നതായിരിക്കുമത്രെ.

മദ്രാസ്—തിരുവനന്തപുരം വിമാന സർവീസ്.

ആഴ്ചയിൽ വ്യാഴം, ഞായർ എന്നീ ദിവസങ്ങൾ ഒഴികെ ബാക്കി അഞ്ചു ദിവസങ്ങളിൽ നടത്തിവന്നിരുന്ന മദ്രാസ്-ബാംഗ്ളൂർ-കൊച്ചി-തിരുവനന്തപുരം വിമാനസർവീസ്, ആഗസ്റ്റ് ഒന്നാം തിയ്യതി മുതൽ ആഴ്ചയിൽ ആറു ദിവസവും ഒക്ടോബർ ഒന്നാം തിയ്യതി മുതൽ ഏഴു ദിവസവുമായി വർദ്ധിപ്പിച്ചിരിക്കുന്നതായറിയുന്നു.

'ഫോസ്ഫാറിക്' വളം നിർമ്മിയ്ക്കുന്നതിനായുള്ള കമ്പനി.

തൃശ്ശിനാപ്പള്ളിയ്ക്കു സമീപം അടുത്തുതന്നെ 'ഫോസ്ഫാറിക്' വളം നിർമ്മിയ്ക്കുന്നതിനായുള്ള ഒരു കമ്പനി സ്ഥാപിയ്ക്കപ്പെടുന്നതായിരിക്കുമെന്ന് അറിയുന്നു. ഒന്നാം വർഷത്തിൽതന്നെ ഏകദേശം 9,000 ടൺ വളം നിർമ്മിയ്ക്കുവാൻ ഇതിനു സാധിയ്ക്കുന്നതായിരിക്കുമത്രെ.

നിരക്ഷരത്വം വിപാടനം ചെയ്യുവാൻ ഹൈദ്രബാദ് ഗവർമ്മെൻറിൻെറ പരിശ്രമം.

അഞ്ചു കൊല്ലങ്ങൾക്കുള്ളിൽ സംസ്ഥാനത്തിലെ നിരക്ഷരത്വം പാടെ പരിഹരിയ്ക്കുവാൻ, 1,42,87,292 രൂപാ ചിലവു വരുന്ന ഒരു പദ്ധതി ഹൈദ്രബാദ് ഗവർമ്മെൻറ് അനുവദിച്ചിരിക്കുന്നു.

മദ്ധ്യസംസ്ഥാനത്തിൽ ഒരു 'അലൂമിനിയം' കമ്പനി.

മദ്ധ്യസംസ്ഥാനത്തിൽ "അലൂമിനിയം" ഉല്പാദിപ്പിയ്ക്കുന്നതിനായുള്ള ഒരു കമ്പനി സ്ഥാപിക്കുവാൻ മദ്ധ്യസംസ്ഥാനഗവർമ്മെൻറ് തീരുമാനിച്ചിരിക്കുന്നു.

പാക്കിസ്ഥാൻ ഗവർമ്മെൻറ് ഗോതമ്പുപദാർത്ഥങ്ങളുടെ കയററുമതി നിരോധിയ്ക്കുന്നു.

ഇന്ത്യൻഡൊമിനിയനിലേക്ക് ഇനി മുതൽ ഗോതമ്പു പദാർത്ഥങ്ങൾ കയററുമതി ചെയ്യുവാൻ പാടില്ലെന്ന് പാകിസ്ഥാൻ താല്ക്കാലിക ഗവർമ്മെൻറ് സിൻഡ് ഗവർമ്മെൻറിനു നിർദ്ദേശം നൽകിയിരിക്കുന്നു.

യുദ്ധസാമഗ്രികൾ നിർമ്മിയ്ക്കുന്നതിന് അമേരിക്കൻ ഗവർമ്മെൻറ് പദ്ധതി.

പുതിയൊരു യുദ്ധം അമേരിക്കയെ അഭിമുഖീകരിക്കുന്നതായാൽ, ആ അവസരത്തിൽ വേണ്ട യുദ്ധസാമഗ്രികൾ നിർമ്മിയ്ക്കുന്നതിനായി അറുപതു വ്യാവസായികസ്ഥാപനങ്ങൾ ഗവർമ്മെൻറിൻെറ ഉടമസ്ഥതയിൽ ഉണ്ടായിരിക്കുമെന്ന് തങ്ങൾ പ്രതീക്ഷിയ്ക്കുന്നുവെന്ന് അമേരിക്കൻ യുദ്ധവകുപ്പ് പ്രസ്താവിച്ചിരിക്കുന്നു.

കുറിപ്പുകൾ.

ഭാരതത്തിന്റെ വ്യാവസായിക വികസനം.

അമേരിക്കയിലെ "ന്യൂ റിപ്പബ്ലിക്ക്" മാസികയിൽ പ്രസിദ്ധപ്പെടുത്തുന്നതിനായി പണ്ഡിററ് ജവഹർലാൽ നെഹ്റു അടുത്തൊരവസരത്തിൽ അയച്ചുകൊടുത്തിരിക്കുന്ന ഒരു "കേബിൾ" സന്ദേശത്തിൽ, ഭാരതത്തിലുള്ള വ്യവസായങ്ങളുടെ വികസനത്തെപ്പററി പ്രസ്താവിച്ചിരിക്കുന്നു. ഈ പ്രസ്താവനയിൽനിന്നും, വ്യാവസായിക വിഷയങ്ങളെക്കുറിച്ച് ഇന്ത്യാഗവർമ്മെൻറ് അംഗീകരിച്ചിട്ടുള്ള മനോഭാവമെന്തെന്ന് ഗ്രഹിയ്ക്കുവാൻ ഏറെക്കുറെ സാധിയ്ക്കുന്നതാണ്.

പുരോഗമനപരമായ ഏതൊരു വ്യാവസായികപദ്ധതിയിലും വിദേശീയമൂലധനത്തിനു സ്ഥാനം ഉണ്ടായിരിക്കുന്നതാണെന്ന് ആ പ്രസ്താവനയിൽ സൂചിപ്പിച്ചിട്ടുണ്ട്. പക്ഷെ ഭാരതത്തിലുള്ള വ്യവസായങ്ങളുടെ നിയന്ത്രണാധികാരം ഭാരതീയക്ക് മാത്രമാണുള്ളതെന്നും അതോടൊപ്പംതന്നെ പണ്ഡിററ് നെഹ്റു വിശദമായി പ്രസ്താവിച്ചിരിക്കുന്നു. ഈ തത്വം ഭാരതത്തിന്റെ വ്യാവസായികവികസനത്തിന് അത്യന്താപേക്ഷിതമായിട്ടുള്ളതാണെന്ന് പറയാതെ തരമില്ല. ഭാരതത്തിലുള്ള വ്യവസായങ്ങൾ വിദേശീയരുടെ നിയന്ത്രണത്തിനും പരമാധികാരത്തിനും വിധേയമാണെങ്കിൽ, അത്തരം വ്യവസായങ്ങളിൽനിന്നും ഭാരതത്തിനു ഗണ്യമായ ഗുണങ്ങളൊന്നുംതന്നെ പ്രതീക്ഷിക്കുവാൻ ന്യായം കാണുന്നില്ല. സ്വന്തതാല്പര്യങ്ങളെ മുൻനിൎത്തി അവർ അംഗീകരിയ്ക്കുന്ന പല കൃത്യങ്ങളും ഭാരതത്തിന്റെ വ്യാവസായികവികസനത്തിനു മുമ്പിൽ വിഘാതങ്ങളായെന്നു വന്നേക്കാം. ഭാരതത്തിലുള്ള വ്യവസായങ്ങളുടെ പുരോഗതിയെ തടയുവാൻ അവയ്ക്കു സാധിയ്ക്കുന്നതുമാണ്. ഈ പരമാൎത്ഥത്തെ മുൻനിൎത്തിയാണ്, ഭാരതീയവ്യവസായമണ്ഡലത്തിൽ വിദേശീയാധികാരം അനുവദനീയമല്ലെന്ന് ഇന്ത്യാഗവർമ്മെൻറ് നിശ്ചയിച്ചിരിക്കുന്നത്. പക്ഷെ വ്യാവസായികപദ്ധതികളിൽ മൂലധനം നിക്ഷേപിയ്ക്കുന്നതിനു വിദേശീയരെ അനുവദിയ്ക്കുന്നതിൽനിന്നും വ്യവസായങ്ങളുടെ വികസനത്തിനു യാതൊരു ഹാനിയും ഉണ്ടാകുവാൻ വഴിയില്ല. പ്രത്യുത, വ്യവസായങ്ങളുടെ പ്രവൎത്തനങ്ങൾക്ക് അവശ്യം ആവശ്യമായ മൂലധനം തദ്വാരാ ലഭിയ്ക്കാവുന്നതുമാണല്ലൊ.

ഇതിനും പുറമെ, ഭാരതത്തിലെ ചില മൌലിക വ്യവസായങ്ങളേയും പൊതുസ്ഥാപനങ്ങളേയും ഗവർമ്മെൻറിന്റെ നിയന്ത്രണാധികാരത്തിനു വിധേയമാക്കുന്നതിനു വഴിയുണ്ടെന്നും പണ്ഡിററ് നെഹ്റു ത

ൻെറ സന്ദേശത്തിൽ സൂചിപ്പിച്ചിട്ടുണ്ട്". ഇത്തരമൊരു നയവും ഇന്നത്തെ സ്ഥിതിഗതികളിൽ ഭാരതത്തിൻെറ വ്യാവസായികവികസനത്തിന്" അത്യാവശ്യകരമായിട്ടാണിരിക്കുന്നതു്. മൗലികങ്ങളായ വ്യവസായങ്ങളെ സാമാന്യ ജനങ്ങളുടെ നിയന്ത്രണാധികാരത്തിനു വിധേയമാക്കുന്നതു് പല പ്രകാരത്തിലും ആശാസ്യമല്ലെന്നു് ഇതിനകം വ്യക്തമായിക്കഴിഞ്ഞിട്ടുണ്ട്". സ്വന്തതാല്പര്യങ്ങളെ സാധിപ്പിയ്ക്കുന്നതിനായി അവർക്ക്" അത്തരം വ്യവസായങ്ങളുടെ താല്പര്യങ്ങളെപ്പോലും വിസ്മരിക്കേണ്ടി വരുന്നതിൽ അതിശയത്തിന്" അവകാശമില്ല. തന്മൂലം ആ വ്യവസായങ്ങളുടെ വികസനവും അഭിവൃദ്ധിയും സാദ്ധ്യമാകാതെ വരുന്നുമാണ്". പക്ഷെ രാഷ്ട്രത്തിൻെറ താല്പര്യങ്ങളെ പ്രതിനിധീകരിക്കുന്ന ഗവർമ്മെൻറിൻെറ മേൽനോട്ടത്തിലും നിയന്ത്രണാധികാരത്തിലും ഇത്തരം അനാശാസ്യതകൾ സംഭവിയ്ക്കുന്നതിന്" യാതൊരു മാർഗ്ഗവും കാണുന്നില്ല. മൗലികങ്ങളായ വ്യവസായങ്ങളേയും പൊതുസ്ഥാപനങ്ങളേയും സാമാന്യജനങ്ങളുടെ നിയന്ത്രണത്തിൽനിന്നും മാററിനിർത്തി, ഗവർമ്മെൻറിൻെറ മേൽനോട്ടത്തിലാക്കേണ്ടതിൻെറ ആവശ്യകത ഇതിൽനിന്നും വ്യക്തമാകുന്നുണ്ടല്ലൊ.

ആർക്കാണ്" സ്ഥാനം!

വക്കീൽ:— കക്ഷിയോട്" "ഈ കേസിൽ ഞാൻ ഇത്രമാത്രം ബുദ്ധിമുട്ടിയില്ലെങ്കിൽ നിങ്ങൾ നിശ്ചയമായും തോററുപോകുമായിരുന്നു."

കക്ഷി:— "പക്ഷെ, ഈ വിജയത്തിന്" ഞാനും വളരെ സഹായിച്ചിട്ടുണ്ട്".

വക്കീൽ:— "അതെന്താണ്"."

കക്ഷി:— "ഞാൻ ചെയ്ത കാര്യം കോടതിയിൽ ഏററുപറയാതിരുന്നതു്"."

ശരിയായ സംശയം!

അതിധൃതിയോടെ അപ്പം വിഴുങ്ങുന്ന ഒരു കുട്ടിയോട്", പിതാവ്":— മകനേ! അത്ര ആർത്തിയോടെ ഒന്നും ഭക്ഷിക്കരുതു്. കഴിഞ്ഞ വർഷത്തിലാണെന്നു തോന്നുന്നു, അയൽവീട്ടുകാരിയുടെ ചെറുക്കൻ പകുതി റൊട്ടി തിന്നപ്പോഴേക്കും മരിച്ചുപോയി.

കുട്ടി:— അപ്പോൾ അച്ഛാ! മറേറ പകുതി റൊട്ടി എന്തു ചെയ്തു?

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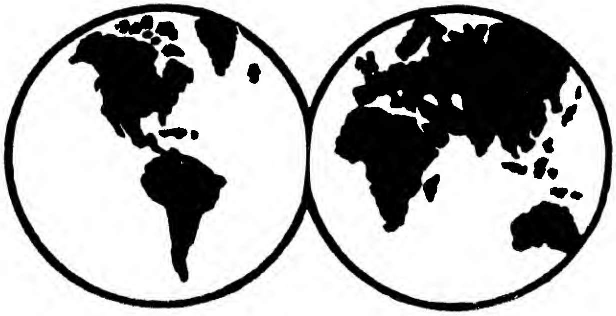

FACT

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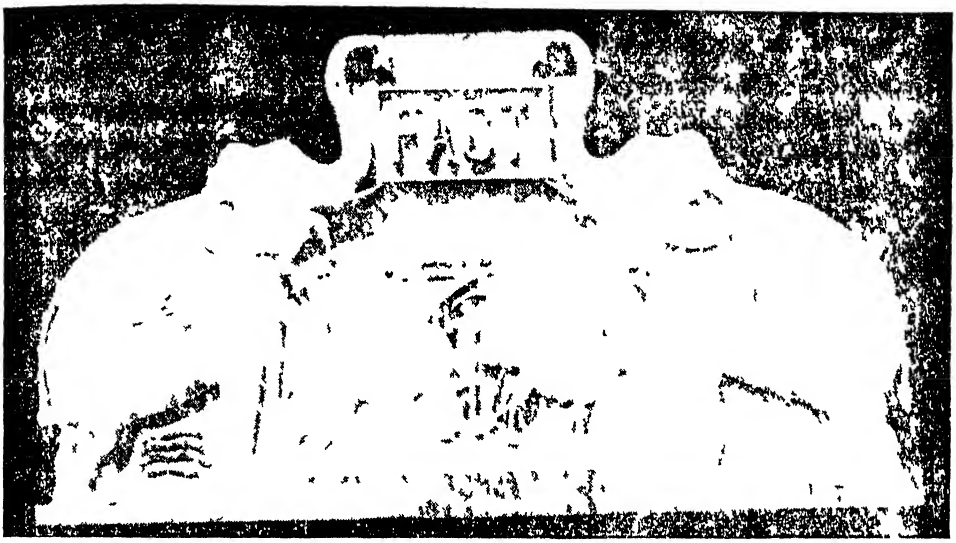
Advertisements— Pages A to F

On the Cover page.

Ammonia Synthesis Converter Tower. The height of the tower is 120 ft; the height of the Converter itself is approx. 41 ft. the Converter Shell with the Catalist Basket weighs about 70 tons. A 100 HP Electric Motor is provided at the top for purposes of movement of the Converter for repairs or for reloading of the catalyst as and when required.



VOL II SEPTEMBER 1947 NO. 2

EDITORIAL

Since the publication of the last issue of FACT, important changes have occurred in Travancore which need mention. Travancore has become a willing and free member of the Indian Union. His Highness has promulgated a proclamation granting full Responsible Government to the people, and the proclamation is universally hailed as satisfactory and in consonance with the wishes of the people We offer our humble congratulations and praise to His Highness and the Royal Family for the bold and wise step they have taken.

After 16 years of hard and efficient work for the State, Sachivothama Sir C. P Ramaswami Aiyar has retired from service to enable himself to devote the rest of his life for literary and philosophical work. In describing his great services we cannot do better than quote the Gazette Extraordinary announcing the retirement which runs as follows:-

> "Today Travancore has achieved an international reputation as a result of his unremitting and devoted labours. His contribution towards the promulgation of the Temple Entry Proclamation, the abolition of capital punishment,

the establishment of the Travancore University with a special bias towards scientific investigation and research, and a comprehensive husbanding of the State's natural resources are among the more distinguishing features of his administration. His prompt steps for the procurement and rationing of rice and food-grains were so timely as to avert the threatening famine conditions of a critical period. His financial measures augmented the State's revenues fourfold without resort to additional taxation.

Since December last Sir Ramaswami Aiyar has expressed a strong desire to lay down the Dewanship and devote himself to congenial literary pursuits, but the course of events deferred the step so long.

With a full appreciation of his unique services whose value time will show, and with sincere regret, His Highness has given his consent to Sir Ramaswami Aiyar's retirement. His Highness's best wishes and warmest regards follow him in his well-earned rest, for health, happiness and long life."

FACT will always remember him gratefully as the great architect of this huge enterprise which he has nursed and brought to the present state through the most difficult period of the second World War.

Mr. P. G. N. Unnithan, the Acting Dewan is well known to the citizens of Travancore as a very experienced and able officer. His tenure of office as Administrative Secretary, which he filled with distinction, makes him specially fitted for his new high office. We offer Mr. Unnithan our hearty felicitations and best wishes for his success in the great task ahead at this critical period in the history of our country.

We look forward with confidence to an era of continued industrial progress resulting in greater productive capacity which is the most primary need for our country and which should take precedence over all other things.

Editorial Board.

Some Aspects of the Vanaspati Problem

By

PROF. V. SUBRAHMANYAN, D Sc., F. R. I. C. F. N. I.
AND
DR. S S. DE. D Sc.,
Department of Biochemistry, Indian Institute of Science, Bangalore.

THE Vanaspati Industry which grew from comparatively small beginnings in the early thirties is today one of the major food industries in the country. The capital and equipment involved would amount to about twenty crores of rupees, and the annual turn-over, about thirty crores.

STATE DECISION TO EXPAND THE INDUSTRY.

In 1945, it was decided by the Central Government that the Vanaspati Industry should be expanded threefold and that about fifty more factories should be established in the different parts of the country. The target aimed at was a production of 450,000 tons by 1950. It was argued by the sponsors that vanaspati is a clean and wholesome product and that, being also cheap, its production and extended use as the 'poor man's ghee' deserve to be encouraged. Accordingly, plans for the expansion of the industry were drawn up, and important decisions regarding the location and capacity of the factories were reached at a meeting of the representatives of the different Provinces and States. Following this, about forty new companies were floated and about five crores of rupees of fresh capital were collected. Orders were also placed in Europe and elsewhere for the supply of machinery and other accessories.

RECENT CHANGE OF OUTLOOK.

It is not clear as to whether there was much opposition when it was first decided to expand the industry, but, apprehension was expressed from several quarters about the possible consequences of such an expansion. A large volume of objection came from popular leaders, who sincerely felt that vanaspati is injurious to health and that its production should be stopped completely. There were several reports from consumers which were entitled to respect and careful consideration. Objections also came from people engaged in ghee trade who felt that the production of the genuine product was seriously threatened. The cattle breeders also objected to the expansion of the Vanaspati Industry. The Honourable Member for Food and Agriculture (Dr. Rajendra Prasad) felt diffident about the future of the whole industry, especially in the face of evidence obtained by Kay and Pal at Izatnagar regarding the injurious effect of vanaspati if fed as the main source of fat to successive generations of experimental animals. At the meeting of the Food Technical Panel held at Delhi

towards the end of November 1946, Dr. Rajendra Prasad expressed his anxiety about the position and pleaded for a very early, critical, scientific investigation which would be thorough and comprehensive, and which would present conclusive evidence, on the basis of which, the Government could take the correct final decision in regard to the subject. Acting on this suggestion, the Panel under the Chairmanship of Sir S. S. Bhatnagar formed a Special Committee of scientific workers representing different laboratories to go exhaustively into the question with special reference to the conditions prevalent in India. The Committee met at Delhi during January 1947 and drew up detailed plans for a careful study of the effect of vanaspati as compared with the corresponding raw oil and also with ghee. The programme included the study of vanaspati of two melting points (37°C and 41°C); the comparative effects of ghee, vanaspati and oil at 5% level both when fed along with an otherwise adequate diet and also with a poor vegetarian diet consisting chiefly of rice (about 80%) and a small proportion (about 5%) of pulses. The effect of supplementing the poor diet with further quantities of protein minerals (especially calcium) and vitamins was also included in the programme. The studies on supplements were included, so that, if there is any injurious effect, it might be ascertained whether any addition would afford relief. The observation are to be continued for three generations which, in the case of the rat, would cover about a year. The animal experiments are to be carried out at four different centres in the country. Plans have also been drawn up for carrying out metabolism studies with human subjects at as many centres as possible. Studies will also be carried out in institutions where the inmates would be under continuous observation. The entire programme may occupy about eighteen months and allowing a margin of about six months for finishing touches, comparison of notes, preparation of reports, etc., the final results should be available early in 1949. Interim reports will of course be available at a much earlier date.

MORE RECENT DEVELOPMENTS.

So far as the Government is concerned, the technical position is still an open issue. The earlier scientific studies on the subject, as also the present programme of research are not as well known as they should be, and there has naturally been a good deal of diffidence in the minds of the public, over the subject. In fairness to the consuming public and the industry, there is need for an authoritative statement on the subject. This should be done as soon as possible either by the Central Government or any scientific or other organisation authorised by it.

About four months ago, the prices of vegetable oils were decontrolled with the result that the prices rose high. The price of vanas-

pati which was controlled remained at the original level. The industry suspended production for some months as a gesture of protest. Quite recently, a compromise was reached, the Government agreeing to some increase in price and the products are again on the market.

THE PRESENT STATE OF KNOWLEDGE REGARDING THE NUTRITIVE VALUE OF MARGARINE AND VANASPATI AS COMPARED WITH BUTTER AND GHEE.

The history of the Vanaspati Industry in India bears a close analogy to that of the Margarine Industry in the West. Both of these products were first produced as cheap substitutes and were also extensively used as adulterants for butter and ghee respectively. Subsequently, the related industries came to develop on their own merits. The Margarine Industry in Europe and America is today a well established one, some of the good brands being comparable in regard to taste, and flavour with some of the best brands of butter produced in those countries. By State legislation, margarine also contains added vitamins to correspond to that of butter. The vanaspati in India was also being steadily improved, the Government bringing in more and more controls to discourage the use of the product for adulteration of ghee and to ensure that the public obtained a clean and easily digestable product of good quality which could be used for a variety of purposes. Recently, the Government has decided that the melting point of Vanaspati should not be above the body temperature (37°C), so that the product could be easily digested in the human body. The Government have also ruled that vanaspati should contain at least 5% of sesamum oil which can be easily detected if the product is used as an adulterant for ghee. Plans for the vitaminisation of vanaspati are also under the consideration of the Government.

Evidence obtained in Europe and America during the past four decades would show that margarine (which contains hydrogenated oil of the same type as vanaspati) can be suitably processed, supplemented and fortified, so that it will provide a pleasant and palatable product possessing the same nutritive value as butter, but at a fraction of the cost of the latter. If the diet of the people of India would correspond to that of Europe and America, it could today be safely predicated that, if similar controls are introduced, vanaspati would be as good a food product as margarine. That is not however possible because of the different type of diet consumed by a large section of the people of India. *The effect of continued feeding of vanaspati on a poor vegetarian diet especially one composed predominantly of rice—is one about which no authoritative opinion could now be expressed*. It has been realised that the proper scientific procedure would be to compare vanaspati with ghee and oil primarily as a source of fat and that is now being done. The effect of the fat on other food

constituents, including body reserves is being followed. The results of that work will soon be available to the public.

VITAMIN FORTIFICATION OF VANASPATI AND MARGARINE

Genuine ghee has long been prized as a high class article of food because of its attractive appearance, flavour, taste and all round usefulness both as a general article of food and as a high class, cooking medium. Pure ghee also contains about 550 International Units of vitamin A per ounce and about 25 units of vitamin D per litre. No vegetable oil by itself would compare with ghee as a popular article of food, though scientific evidence has tended to show that the nutritive value of vegetable oils supplemented with added vitamins would be nearly the same as that of ghee or butter when the diet is otherwise adequate.

Vanaspati possesses many of the desirable attributes of ghee viz., attractive appearance, good grain structure and pleasing taste and flavour. It makes an excellent cooking medium and food materials prepared in a good brand of Vanaspati have practically the same taste and flavour as those prepared in ghee. Some of the best brands of vanaspati actually contain some natural ghee flavour obtained from lactic fermented cow and buffalo milk. Many brands of vanaspati contain added vitamin D, but no brand yet contains vitamins A either as such or in the form of pro-vitamin A as represented by carotenoid pigments from vegetable sources. The main reason for this omission lies in the fact that the controlled price of vanaspati does not provide for any extra charge to cover the cost of vitaminising. Vanaspati is not always used for frying, a process that will cause the destruction of vitamin A, and if it is to be poor man's ghee, it should be adequately fortified with vitamins. The margarine industry is now compelled, by law, to incorporate the required amount of vitamins. In the interests of the consumers, the Vanaspati Industry should also be similarly compelled to incorporate vitamins to correspond to the same levels as those in ghee. At the same time, the State should make it worthwhile for the industry to add the vitamins. The cost of vitaminisation would be comparatively low and the industry should have no difficulty in obtaining ample supplies from out of raw materials available in the country. These and related matters are already engaging the attention of Government Committees and it is hoped that some firm decision will be taken at an early date.

Vanaspati, as now produced, is considered both by the manufacturers and by a large section of the consumers as being essentially a frying medium. In this respect it would correspond to the shortening used for different fried and baked preparations in Europe and America. The poor man in India can afford very little fat and he does practically no frying. If the industry is to be properly developed, it ought to aim at producing a good edible preparation suitable for all round use.

In India, margarine is not so popular as in Europe and America. Margarine does not keep so well as vanaspati, but it can be tinned and pasteurised in the same way as butter. If such a product is cheaply available, it will come within the reach of the poor people. The usefulness of margarine has been known and appreciated in other countries. There is a case for encouraging the production of margarine of good quality in India.

THE HIRAKUD DAM PROJECT

(POSSIBILITIES OF MULTI-PURPOSE DEVELOPMENT OF MAHANADI)

ORISSA may be transformed from a Province of poverty and agrarian backwardness into a prosperous agricultural and industrial area after the construction of the Hirakud Dam. A vision of this change is contained in a report on the project submitted by the Chairman of Central Waterways Irrigation Navigation Commission to the Government of India. The report which compares Orissa of the present to Ukraine (USSR) before the construction of the Dnieper Dam describes how the province will as a result of the forthcoming multi-purpose scheme develop into a region of utmost importance to the wealth and security of the whole country, with its newly increased food supply, its industrial exploitation of rich mineral resources and its command of strategically important waterways.

The waters of the Mahanadi, says the report, if fully harnessed, can, besides affording complete flood protection to the delta areas, irrigate over 20 million acres of land (if that much land is available), generate four million k. w. of power (which is twice the total power developed at the 26 dams of the Tennesse Valley Authority), provide a navigable waterway with a minimum draught of 9 to 10 feet, extending 380 miles from the border of Central Provinces to the sea, make it possible to develop a deep sea port for Orissa at Chandbali or Dhamra capable of handling nearly 6 million tons of traffic (the annual traffic handled by the Port of Calcutta in the pre-war years being nearly 10 million tons), create extensive lakes to serve as seaplane bases and afford facilities for fish culture, recreation, etc.

The scheme of unified development of the Mahanadi valley will consist of three units, namely the Hirakud Dam Project, the Tikarpara Dam Project and the Naraj Dam Project, each one with its own canal system and hydro-electric power installations. Each of these three units will be individually capable of independent development, irrespective of whether the other two are constructed or not, and of forming an integral part of the basin-wide plan. As a first step it is proposed to make a start with the construction of the Hirakud Dam Project.

Of the three units of the basin-wide plan, the Hirakud Dam Project lies uppermost on the Mahanadi river and is the simplest in respect of physical features, territorial considerations, and design and construction requirements. It is also one which may yield the quickest results. It will be financially self-supporting. This project, which

forms the main subject matter of the report, comprises the construction of a dam across the Mahanadi about 9 miles upstream of the town of Sambalpur with gravity and lift canals on either side and two hydro-electric installations.

POWER AND PERENNIAL IRRIGATION TO LARGE AREAS

The Dam will be nearly three miles in length across the main channel with 17 miles length of low dykes on the two sides. The maximum height of the dam above the deepest river bed will be 150 ft. The reservoir formed by the dam will rise to 625.00 above mean sea level and submerge an area of 135,000 acres, of which nearly 70,000 acres will be cultivated land. It will have a gross storage capacity of 5.3 million acre feet of which 1.2 m. a. ft. will be dead storage to serve as silt reserve and to provide head for generating power. The remaining 4.1 m. a. ft. will be live or usable storage for use of irrigation, hydro-electric power and flood control and for improving navigation facilities.

The storage of water and its use as envisaged in the project will in no way adversely affect the water rights of the upper or lower riparian States, including Central Provinces. The lower States will be beneficially affected, as excessive floods will be controlled and minimum dry weather supplies materially improved.

Besides benefiting the 1,094,953 acres of land in Sambalpur District and Sonepur State, which will receive irrigation from the Hirakud Dam, the regulated supplies from the latter (ranging between 8,800 to 14,000 cusecs during the dry months against the present minimum of about 1,000 cusecs at Naraj) will provide protective irrigation to existing irrigated areas in the delta during critical periods of short supply, and enable perennial irrigation to be extended to other large areas in the delta.

Power will be generated at the Hirakud Dam in two parts; one at the main dam at Hirakud to utilise the fall created by the construction of the dam; and the second at the subsidiary dam forming the balancing reservoir at the end of the power channel from the upper power house, to utilise the steep slope in the river below Hirakud. The operating heads at the two power houses will be nearly (85 ft.) equal the total installed capacity at the two power houses will be 350,000 k. w., with six units of 25,000 k. w. each installed at the upper power station and eight units of 25,000 k. w. each at the lower power station. The installation of units will be done by stages to suit the development of load.

It is proposed to connect the Hirakud Power Stations by means of 132 k. v. transmission lines to Cuttack and Jamshedpur and later on to Machkund Power Station.

INDUSTRIAL POSSIBILITIES.

With cheap hydro-electric power to the extent of 300,000 k. w. made available by the construction of the Hirakud Dam, it will be pos-

sible to set up an industrial town in the neighbourhood of Sambalpur, where factories can be installed for the manufacture of cement, iron, steel, aluminium, paper, ferro-alloys, textiles, sugar, cotton, fertiliser, chemicals and other products. Raw materials including coal, iron, limestone, bauxite, timber, grasses, etc. are available within easy reach. If the bulk of the manufactures are concentrated in the neighbourhood of the power stations, considerable savings will be effected in transmission losses, and consequently in manufacture costs. This fact is of particular importance in the manufacture of aluminium and fertilisers.

Whereas the Mahanadi river affords no facilities for navigation in its present condition the construction of the Dam and consequent improvement in the regime of the river will render the river a navigable waterway.

With a certain amount of blasting of the jutting rocks in the river bed and other conservancy measures, the navigability of the river can be very materially improved, thus making it possible for 600 to 800 ton tows to ply from the sea to Dalab and thence via the power-cum-navigation canal through a series of locks into the reservoir and on to the Central Provinces. There are possibilities of developing inland ports at Cuttack, Dasapur, Sopurothpur, Kantilo, Naupara, Sania, Tikarpara, Kaintragarh, Baudh, Baunsuni, Sonepur and Binka; and a major deep sea port at Chandbali or Dhamra. The full development of these facilities will, however, be possible only after the construction of one of the two lower dams at Tikarpara or Naraj.

It is estimated that the Hirakud Dam Project will cost Rs. 47.81 crores, 6.11 crores charged to flood control, 11.12 crores to irrigation, 29.58 crores to power and 1 crore to navigation. Assuming interest on capital to be 3 per cent, says the report, the project will begin to pay from the eleventh year. In the eighteenth year the accumulated interest on direct outlay will just balance the cumulative revenue up to that year. The percentage return, thereafter, will be 4 29 per cent gross, on the sum-at-charge thus giving a net annual profit of 61.15 lakhs or 1.29 per cent. In addition, the construction of the dam will lead to an annual increase of 34,000 tons in the food products of Sambalpur District and Sonepur State and a very substantial increase in that of the Delta.

LIBERAL POLICY OF RESETTLEMENT.

The report refers to the agitation among certain sections of the people of the area, which will be submerged by the Hirakud reservoir. This region is about 166 square miles containing 163 villages in 8 Police Station areas in Sadar and Bargah sub-divisions of Sambalpur District, including nearly 70,000 acres cultivated land, 17,700 houses of all descriptions and other property, the entire cost of acquisition being roughly estimated at more than Rs 5.6 crores. Immediate steps must be taken, says the report, to decide the programme and policy of resettelment of the dislocated people. The report suggests, further, that the policy of Government should be, as far as possible, to give

land in exchange of land, well ahead of the actual date of submergence. As no appreciable area will be submerged within the first two years of the construction, it should be possible to give the cultivators possession of their new lands a few months prior to their vacating their original home lands. Suitable lands which are said to be available in the Government and Zamindari forests, the Burra junlge and Gochar areas, may meanwhile be reclaimed and made fit for occupation. Government must, says the report, strive to create in the new colonies conditions distinctly better than those prevailing in the existing settlements.

On the question, whether the Hirakud reservoir may have the effect of submerging valuable mineral deposits, an appendix to the report deals with the minerals which are commonly believed to be affected by the project. According to opinions expressed independently both by Geological Survey of India and Consultant Geologist from America, no mineral of economic value is likely to be submerged in the Hirakud reservoir.

Hints to Engineers.

The ability to see the obvious is a rare and valuable talent, commanding a high price.

* * * * *

To succeed an engineer must learn how to get along with the man above, the man alongside, the man below and with his own self.

* * * * *

If you can't get along with a few people it may be theit fault. If you can't get along with many, it's always your own fault.

* * * * *

Average technical ability multiplied through co-operative effort accomplishes more than great talent working alone.

* * * * *

Don't expect high position if you lack the courage to stand on your own feet, take full responsibility, make firm decisions and face the consequences without flinching.

* * * * *

FUELS IN TRAVANCORE

PART I

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An extract from the text of a talk recently broadcast by the author from the Trivandrum Radio Station. By kind permission of the Director—Trivandrum Radio Station.

ANY material which burns continuously and produces heat may be called a fuel. To the average person, fuels appear to be of importance only for cooking. The uses of fuels, however, extend beyond the home to all industries, and the fuel resources of a country are of great significance in its industrial economy. Even in the home, the quantity used in the household, when multiplied a millionfold, becomes quite colossal and any wastage, even if slight, becomes a heavy national drain.

Fuels may be solid, liquid or gaseous. Some fuels are used in the form in which they are collected such as fuel-wood and coal. Others are obtained from these natural fuels by further processing. The solid fuels in Travancore include, fuel-wood, charcoal, coal, leaves, ligneous products such as coconut shells and saw dust and fossils such as the semi-fossilised logs obtained in Kari lands and lignite. The most prominent among the liquid fuels are petroleum products such as petrol, kerosene, diesel oil and furnace oil. Alcohol is used in stoves and in automobiles We could use vegetable and animal oils also as fuels, but they are more costly than mineral oils and, besides, they are required for several other uses - for eating, soap-making, preservation of boats, illuminants, cosmetics and lubricants.

In some parts of the world, combustible gases gush out of the earth and are burnt as fuel, but this natural gas is not easy to transport and is used up, largely, in the neighbourhood of its source. These are processed gaseous fuels such as wood gas, oil gas and coal gas, obtained by heating wood, oil or coal. Producer gas is obtained by passing hot air, and water gas by passing steam over red hot charcoal or coke. In Travancore, producer gas has been in use in gas engines, notably in Kuttanad for pumping operations and, latterly, in the place of petrol, in motor cars.

There has been little or no planning for fuels in Travancore. The purpose of these talks is to take

stock of the fuel position in the State. As it is not possible to deal adequately with all types of fuels, solid, liquid and gaseous, in the course of one talk, I propose to confine myself this evening to solid fuels only.

Coal is the most important solid fuel in the world. No coal is available in Travancore nor is it likely that coal will be found, because the geological formation is either too recent, as in the lowlands and the lateritic midlands, to contain coal, or too ancient, as in the Western Ghats, to contain any kind of remains of organic life. In India, coal is found in Bengal, Bihar and the Central Provinces. Land transport is very costly, so in India we could get our coal only from Bengal and Bihar by sea. It is necessary to secure cheap freight rates and this is possible only if India has control over its shipping policy and, further, if there is a two way freight so that the ships can be sent loaded in the outward and return journeys. We can export salt and coir products and bring back coal. Even so, we should avoid using coal, for reasons which will appear later in the course of these articles.

Lignite is the name given to a black mineral which looks like and may be called half-formed coal. People who have looked at the Varkalai cliffs at the sea-shore will have seen seams of this black material exposed along the cliff face. It is also met with in the digging of wells and canals. Like coal, it has been formed from the remains of ancient forests, but it has not yet had time to get petrified completely and, in some of the lumps, the structure of the wood from which it is formed can be seen even by the naked eye. The samples that have been hitherto collected and analysed in the laboratory of the Central Research Institute show that our lignite contains too much of earthy impurities to be burnt as much. The ash content of some of the picked samples is as low as twelve percent but more often it contains about 50 per cent.

Apart from its use directly as a low grade coal, lignite can be processed to remove the earthy impurities and, also, it can be distilled to obtain liquid and gaseous fuels from it. The Varkalai formation is extensive and the lignite seams have been met with at Changanacherri, Kottayam and Vaikom. For the present, it cannot be put to any important use, but it is necessary to ascertain, by a thorough mineral survey, the places where it is to be found and, among them, to select those where its quality is good and it can be economically mined. The possibilities of processing it to obtain serviceable fuels have also to be worked out in greater detail. These are long range programmes.

The position of mineral fuels is, therefore, not very promising. It is necessary, however, to remember that minerals are a wasting asset. Coal is accumulated wealth. The product of a million years of natural processes is burnt up within decades and there is no replacement.

The position of the coal supplies of India is not too promising. There is a heavy drain on the superior coking coals of the Indian coal fields which will be in increasing demand as the raw material for fine chemical industry. It is, therefore, not prudent to depend on Indian Coal Supplies for general fuel purposes, nor would it be wise to waste this valuable material for uses for which other fuels can be employed. Yet the sun, which is the giver of these gifts, is showering its energy as bountifully now as in the past. It gives us our crops, our grasses and our trees. Unlike coal, these are replaced annually or at the most, as in the case of fuel wood trees, in a cycle of 15 years. This gives better scope for planning and we need not depend upon hoarded wealth but make use of the current receipts of solar energy.

In Travancore, we have depended in the past only on fuel-wood. We cannot afford to do so for long unless we plan properly. This planning should aim at greater production and, what is more important, on better conservation. One does not realise the extent of wastage of fuels that occurs. Perhaps you think it is small. A simple calculation will show that it is not so. Suppcsing we grant that, on the average, one oz of fuel is wasted per day per individual in the State, the annual wastage works up to 65,000 tons in the year or almost as much as is required for running the Fertilizers and Chemicals Factory. Yet, we all know that the wastage is much more serious than 1 oz. per head per day. Fuel wood had been becoming more and more scarce even before the recent industrial developments. This is because we have been acting life spend-thrifts. There is a mistaken idea that our fuel supplies come mainly from the reserve forests. Actually a great part of it has come from the clearing of private lands. These woods, when cleared, have been turned over to other cultivation and the sources of fuel supply have been gradually receding from the centres of population, making the transport and, therefore, the fuel more costly.

Our reserved forests are rich sources of fuel but not in the form in which nor the place where we wish to have them. Whenever any area is exploited for timber, the branches and the top ends are available, but they cannot be transported easily. Wood is bulky, it contains much water and oxygen in combination.

Government have set an excellent example in connection with the supply of fuel-wood to the Fertilizers and Chemicals Factory. The fuel has to be obtained from reserve forests which contain valuable timber trees and some jungle wood The top-ends and branches of the timber trees and the jungle wood are to be used as fuel, so that by combining the operations of timber exploitation with fuel-wood supply, the forest can be cleared and replanted, not as nature formed it but on a plan, so that, ultimately, instead of a heterogenous mixture we can have the most economical species. Some trees serve a dual

purpose: they can be used for fuel-wood if cut with a rotation of some 15 years, or as timber if allowed to grow for a longer period. It is proposed at Malayattur that a part of the cleared forests should be re-planted with dual purpose species like Irul and Vengai and the rest allowed to copice so that they may regenerate within a period of 15 to 20 years and keep up the supply of fuel-wood. With each such cylce, more and more of the forest will be replanted, giving a stand which can be used either for fuel-wood or for timber according to the economic needs of the State on that future date.

There are no extensive fuel-wood plantations in the State. Three years ago, on the joint recommendation of the Forest Department and the Department of Research, Government sanctioned that 20,000 acres of minor forest areas in different parts of Travancore should be reserved for fuel-wood. It is, however, necessary that for domestic purposes, this should be supplemented by private enterprise. There are stretches of private land on the beaches and in sandy areas as also the scrub lands, unsuitable for cultivation, which would support casuarina or cashew which are both fast growing. In the tea estates they reserve a certain area for the cultivation of fuel-wood to meet their needs for the drying of the tea leaves. Similarly, we, as individuals should make it a rule to plant fuel-wood in all extensive compounds and estates. Unless we do so, we cannot establish a balanced economy in the State.

Side by side with greater production, we must conserve our supplies. Our method of using fuel-wood is extremely wasteful. The cost of fuel-wood is rising. We grumble at it but we will not do anything to reduce the consumption. Charcoal and coke are extensively employed in all other countries but they are in little use in Travancore. Yet, through charcoal we can make accessible to the City dweller the wood fuel which is now going waste in the remoter forests for lack of transport. Saw dust is good fuel, yet it is mostly wasted. The use of a simple type of oven and a little care and thought make available the heating value of saw dust which would help to conserve the fuel-wood supplies I am sure that this idea will appear fantastic, but in fifty years from now, Travancore will give up the burning of fire-wood as such. Instead, wood, leaves and other ligneous material, gathered annually from our plentiful vegetation will be converted into charcoal and gas and perhaps even finely pulverised, and these processed products will be burnt in properly designed hearths which will utilise the heat more efficiently instead of allowing most of it to leak away as now happens.

Processed fuels have been almost entirely neglected in Travancore. Despite its extensive forests and its luxuriant tree growth, or perhaps because of it, we do not produce much charcoal and we

seldom use it in the house. Yet, charcoal can rectify many of the faults of the present fuel economy in the State. Charcoal gives nearly twice the amount of heat as an equal weight of wood, and when used in simpler ovens, the heat is not wasted to the same extent as with wood. Attention was drawn to the need for charcoal during the war for producer gas buses. The Department of Research carried out experiments on the various methods of production of charcoal and examined *mango*, *cashew*, *casuarina*, *maruthu*, *thanni*, *irul*, *vengai*, *punna*, *thembavoo* and *kudakapuli*.

As a result, it was found that:—

1. The pit method, which is now in vogue in some of the forests, gives a low yield of charcoal and the product is neither uniform nor clean;

2. The mud kiln gives a more satisfactory yield but requires excessive attention and is subject to risks of total loss of charcoal if it cracks;

3 A covered rectangular kiln, which can be made of burnt or sun-dried bricks and can be easily erected even in the forest and shifted from place to place, gives a uniform and clean product in good yield, and

4. The Candian type of kiln of the kind built experimentally by the Fertilisers and Chemicals, Travancore Ltd., though expensive to erect and difficult to be moved from place to place, gives the highest yield-even up to 38 per cent. It is our opinion that all things considered, to begin with, the brick kiln will meet our requirements better than the others. Apart from the yield, which is about 25 per cent, the specifications of the product, including its ash content and other qualities can be altered by slight adjustments in the charcoal making operations. These kilns can be constructed in the heart of the forest and when the location has to be shifted, all that is of value, namely the mild steel cover, can be transported to the new location.

There is a still more valuable product, coconut shell charcoal, which is not consumed to the extent to which it could be used in Travancore. While wood gives only a fourth of its weight of charcoal, coconut shells yield 33 per cent charcoal of high calorific value. One drawback with the shells is that they occupy a lot of space. The cup-like shape stands in the way of close packing They also produce acrid fumes when burnt and the fire is erratic, resulting in heavy loss of heat output The charcoal from coconut shell can be packed close, it burns without smoke and the fire is particularly hot. This charcoal possesses another striking quality. It absorbs gases and extracts out colouring matter from solutions. For the former reasons, it was in great demand at the outbreak of the war when it was exported as an important munition of war for the filling of gas masks It is also used for removing colouring matter in the refining of sugar or oils. When processed further or activiated, these properties are much more pronounced.

During the days of its extensive export, the Department of Research examined different methods of production of coconut shell charcoal and found that a small pit capable of carbonising about 7 to 10 thousand shells per day, with a cover made of mild steel could be managed by one labourer and that with two such pits, working on alternate days, one ton of coconut shell could be carbonised each day. The weight of the resulting product is only one-third and the cubic content less than one-sixth so that the charcoal can be transported more easily.

The powder obtained from wood charcoal and coconut shell charcoal can be made into brichquets with the help of binding materials. These give a standard and useful fuel for consumption in the home, in the factory and in motor buses for the production of producer gas.

To sum up: we have plenty of solid fuels in the State, but they are being used up without proper replacement. A balanced economy with a cycle of rotation of 15 years or less can be established, if fuel-wood trees are planted as they are consumed. By suitable processing, the fuel-wood from even the remote forests can be made available. We cannot afford to waste fuel any more than we can afford to waste food, yet our present methods of utilisation of fuel are primitive, inefficient and highly wasteful.

Woman of Distinction.

A man who lives in a Nob Hill hotel noticed that the contents of a bottle of fine bourbon were dropping at a rapid rate. So he made a tiny pencil mark on the label opposite the current level. Returning home that night, he found a note from the chambermaid: "Please don't put a pencil mark on the bottle, because I don't want to put water in such good whisky."

* * * *

You can send a message around the world in one seventh of a second, yet it may take years to force a simple idea through a quarter inch of human skull.

* * * *

Given the unpleasant task of breaking the news to a woman that her husband had committed suicide, a neighbor went to the widow's house. "I bring you bad news," he said. "Your husband just jumped into the river."

"Oh," sighed the woman, "him and his new fountain pen"!

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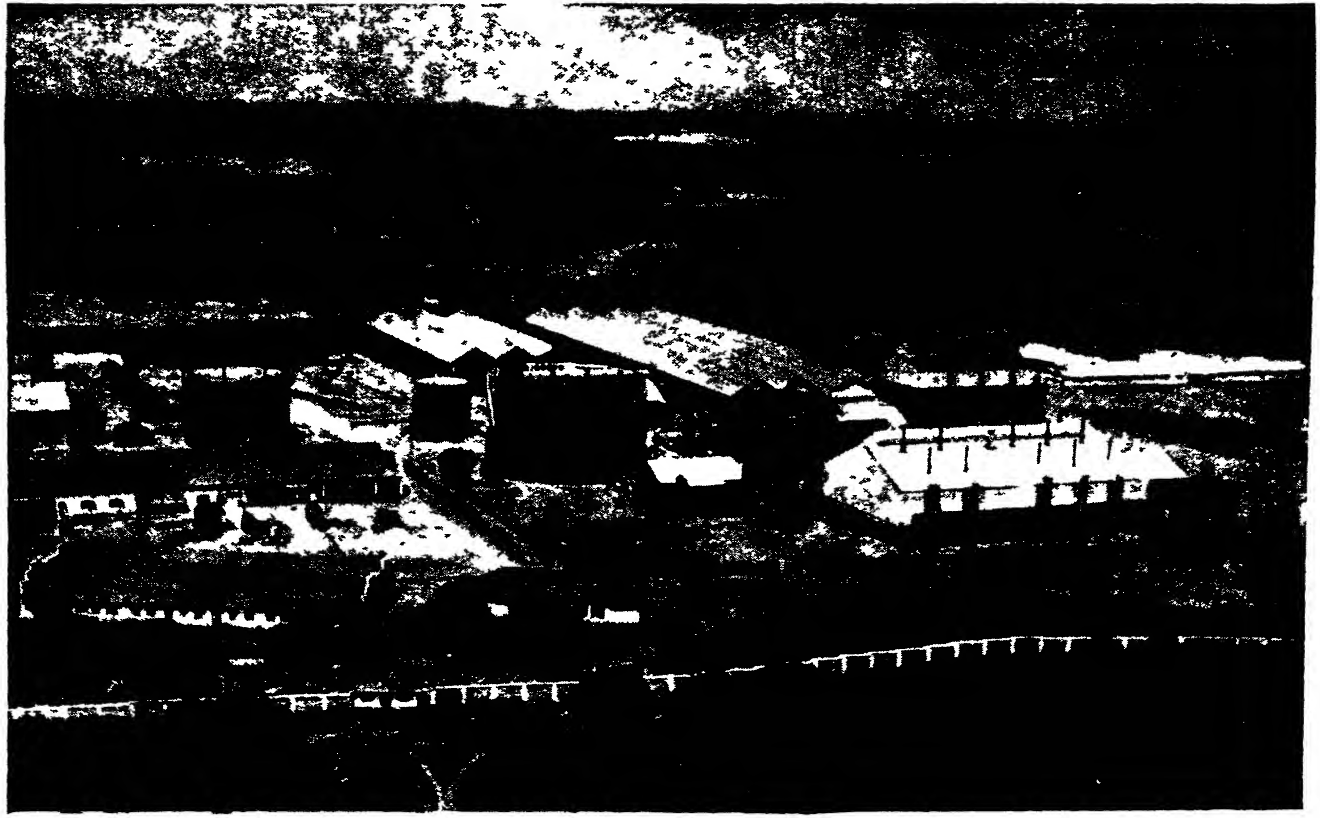
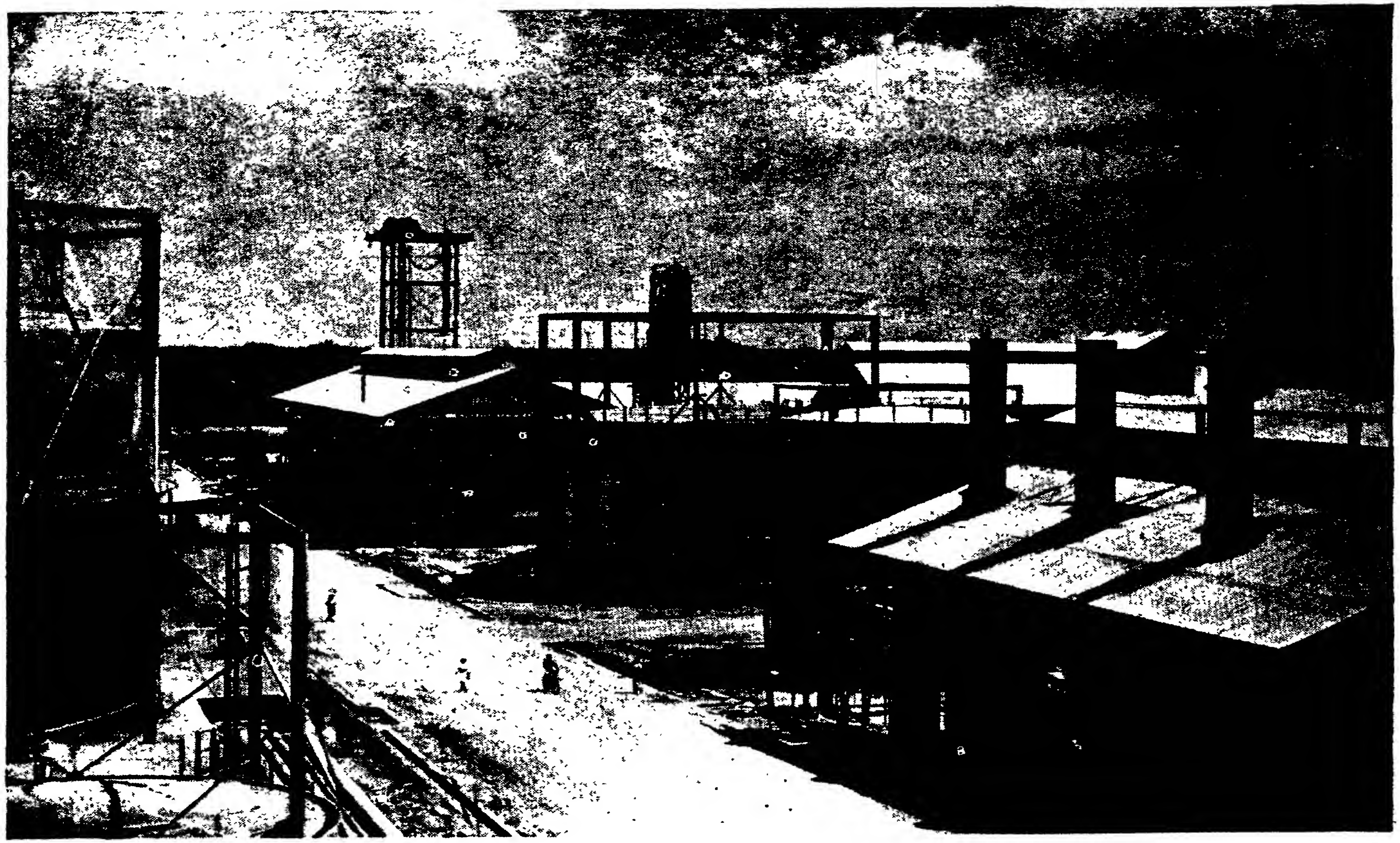
FACT—PEEPS FROM THE AIR



(BY COURTESY OF McGRAW-HILL WORLD NEWS)



(BY COURTESY OF McGRAW-HILL WORLD NEWS)

Agriculture - Flood Control

(BY THE EDITOR)

THE Hirakud Dam, particulars of which have been published elsewhere in this issue, should be a welcome feature at this critical period. It is a happy augury that recently several big schemes viz., the Kosi Dam, Damodar Valley Project, Ramapadasagar Project and the Hirakud Dam have been launched. Detailed particulars of these schemes have appeared in the current and previous issues of FACT. The preliminary work on these projects should be expedited and the execution of the construction work should be taken up by the Central Government direct or through the Provincial Governments, very early.

"The crops have failed for want of rain." "The crops have failed due to too much of rain," these have been the common complaints in India at present. In some years crops fail on account of lack of rain at the correct time, and in some other years crops are destroyed by floods as a result of heavy rain. So much so, the food position in India has remained for several years past very critical. In spite of large imports of food grains and the lowest possible quantity per head being rationed out, the Government has not been able to meet the requirements of her people. Now that the possibilities are that the imports will also gradually decrease, we will find it very difficult to keep ourselves self- sufficient with respect to food unless drastic measures are taken to improve agriculture.

We should no longer depend on nature's idiosyncracies to control our destinies. On the other hand, we must do all our best to control and divert the freaks of nature to our best advantage.

Our water resources which are plenty, need proper harnessing so as to make us less dependent on the monsoon This can only be done by constructing several dams and locks distributed throughout the country to control and regulate the water in the several rivers Incidentally this would also give us an opportunity to put several hydro-electric power projects which are also very essential for the industrialisation of this country. Also navigational facilities can be improved by controlling the water level in the rivers.

No country ean expect to improve its wealth without the help of vast irrigation and hydro-electric power projects. The possibilities of developments of these in India are very great and first priority should be given to these projects over other schemes.

We hope for a day when excess of rain in certain periods at certain places or insufficient rain does not bring about vital failure of food crops. With the proper control of water resources, with the use of chemical fertilisers to replenish the soil and with better implements to dig the soil, we wonder why famines could not be completely wiped out.

The Monozite Sands of Travancore

By

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THE Monozite Deposits of Travancore have attained worldwide importance with the discovery of the 'Atom Bomb'. The coastal sands of Travancore contain the mineral Monozite, which, when concentrated yields about 7-10% of Thoria (ThO_2), from which metallic Thorium can be prepared. The main idea to utilize Thorium may be due to its widespread occurrence than Uranium which is one of the main constituents of the Atom Bomb. Thorium is one of the elements of the rare earth group and possesses radio-active properties (spontaneous disintegration), like Uranium.

Occurrence, Origin and, Distribution of the Deposits:—

The coastal sands of Travancote furnish the world's largest deposits of Monozite and Ilmenite, next being those of Brazil. The deposits are concentrated by the constant disintegrative action of the wind and waves on the decomposed gneisses and pegmatite (coarse granite) containing Monozite, Zircon, Ilmenite, Rutile, Quartz, etc. The principal area is between Cape Comorin and Quilon, and there are five major deposits, namely, Cape Comorin, Muttam, Kovilam, Anjengo and Quilon (Warkalay), the total extent is about hundered miles along the coast.

Regarding the origin of the deposits, these rare minerals are widely distributed in minute quantities and form about .02% of Igneous rocks and they are known to contain about 10-20 grams of fissionable elements per ton (20-25% of which is Uranium, the remainder, Thorium). They are therefore of Igneous origin and occur during final phases of magmatic consolidation, the commonest minerals having Thorium, being Monozite and Allanite.

Deposits:—

The deposits are black in general due to the presence in predominating amounts of Ilmenite and Magnetite. They are sometimes red when garnets are in excess, and gray when Quartz or Calcite is in abundance. Excess of Monozite gives an yellowish tinge to the deposits. All the minerals making up the deposit are in small grains.

The various minerals present in the deposit are:—

	Name		Colour		Composition
1.	Monozite	—	Yellow	—	Phosphate of rare elements. ((Ce, La and Di) Po_4)

2.	Ilmenite	—	Black	—	Oxide of Fe and Ti ($FeTiO_3$)
3.	Magnetite	—	Black	—	Fe_2O_3
4.	Rutile	—	Brownish red	—	TiO_2
5.	Zircon	—	Greyish	—	$ZrSiO_4$
6.	Garnet	—	Red	—	Complex silicate.
7.	Quartz	—	White	—	SiO_2
8.	Calcite	—	White	—	$CaCo_3$

Felspar grains are also present.

Separation of Minerals:—

The magnetic susceptibility of the minerals as well as their individual Sp. Gravity are made use of in the separation of the component minerals. The following is the order of magnetic separation. Ilmenite and Magnetite (highly magnetic), Garnet and Monozite (moderately magnetic), Zircon, Rutile, Quartz and Calcite (practically non-magnetic).

Utilisation:—

The Indian Monozite is very rich in its Thoria content compared to that of Brazil which is only about 4%. Bofore the discovery of Atom Bomb the various excellent bye-products got in the Monozite Industry were very useful and valuable. Till recently all the production was exported, chiefly to U. S. A.

Monozite was the source of Thorium Nitrate, used for the manufacture of incandescent gas mantles which consist of 99% Thoria and 1% Ceria. Nowa days, gas mantles have been replaced by electric lighting, hence there was a great slump in the Monozite industry after 1920.

A small amount of Thoria, with a little ceria is used as an illuminating material in certain search lights and automobile headlights. Thorium compounds are also used in magnesium flash light powders. An alloy of tungstun with a small quantity of metallic Thorium is used in the manufacture of very ductile electric filaments.

The excess of cerium oxide in Monozite is used in the manufacture of Pyrophoric alloys, consisting of about 70% iron and 30% of cerium and other rare earth metals. This alloy is widely used for the manufacture of automatic gas lighters, cigarette lighters miners' safety lamps, tracer bullets and shells. Cerium salts are used to a limited extent in ceramics, making of optical glasses, in tanning and in dyeing. Thorium is radio-active likeUranium, and gives rise to a series of disintegration products, among which Mesothorium resembles Radium in its properties,and uses. It can be prepared from Monozite and it is found that one ton of Monozite containing 5% Thoria, will yield about 2.5m., grms. of Mesothorium. It is very valuable and extensively used in Medical therapy and in luminous paint industry. It is much cheaper than Radium and widely distributed. The other important bye- products in the Monozite Industry and which are economically important are Ilmenite, Zircon and Rutile.

Ilmenite:—

Formerly it was used as a steel hardening alloy in the form of Ferro-Titanium, etc. The modern commercial use of Ilmenite, is in the manufacture of titanium oxide pigment. Titanium oxide when pure and finely ground down, produces a white powder of great opacity and hiding power and the power of opacity is thrice as that of white lead, and twice that of zinc oxide. Till now no attempt has been made to utilise these excellent deposits, of which India possesses the world's largest deposits.

Zircon:—

The chief use of Zircon is in the manufacture of high grade heat refractory Zirconia Bricks, called 'Zirkite'. It is also used in the manufacture of high speed tool steel.

Rutile:—

It is used in making electrodes, for colouring enamels, and ceramic glazes. It was extensively used in wartime for the manufacture of Titanium Tetrachloride which is used for smoke screens.

Garnet and Quartz are used as abrasives and in sand paper manufacture.

Indian Production Figures in 1938.

Mineral		Tons.		Value in Rupees
Monozite	—	5221	—	2,33,700.
Ilmenite	—	252,820	—	15,46,436.
Zircon	—	1,450	—	40,732.

(Recent data not available)

In the present age, we may witness the use of atomic energy as a source of power, and it is desired to transform random high-energy atomic and molecular motion into a form that is readily transported and utilized, and it may be quite necessary that even atomic power has to be converted into electrical energy, as electrical energy is the most versatile and most easily transported form of power.

The present demand for Monozite is for its Thoria content. The method of utilization of Thorium for the production of Atomic energy is still a matter of secrecy. However, it seems that the Thorium deposits of Travancore are bound to play a vital part in the present Atomic era, and it is high time that India should fully utilize her natural deposits of which she has the world monopoly. The present policy of the Travancore Government of imposing a ban on the export of these deposits is a wise step towards state control, conservation and utilization.

QUESTION BOX

Question No. 1.

What is the proper dosage of ammonium sulphate for the Sugarcane crop? When should the fertilizer be applied?

Answer:

Sugarcane is a crop of great economic importance. Field experiments carried out by the Madras Agricultural Department have proved beyond doubt the fact that ammonium sulphate when applied increases the tonnage of the crop. The fertilizer can be applied either alone or in conjunction with groundnut cake or castor cake. The proper dose of ammonium sulphate varies from 200 to 250 lbs, supplying 40 to 50 lbs. of nitrogen per acre. The fertilizer can be applied in two separate doses, one at the time of planting and the other at the time of tillering, that is, three months after planting. Very high yields of cane have been obtained by increasing the acre-dose of ammonium sulphate.

Question No. 2.

How does lime benefit the soil? Which soils need liming?

Answer:

Lime is one of the most indispensable plant foods. Though it is taken up by the plant roots only in small quantities, it is all the same very essential for healthy plant growth. Soils deficient in lime cannot, and will not give maximum production. In addition to its being a direct plant food, lime plays an important role in maintaining the fertility of the soil and improving its structure and texture. Lime prevents the development of acidity or sourness, which is greatly injurious to plant life. As the bulky organic manures decompose, many organic acids are liberated, which, if allowed to accumulate unchecked, will be harmful to crop growth. Lime, when present in adequate amounts, neutralizes these acids and thus renders them innocuous; consequently lime hastens the rotting of manures. Lime also liberates potash (a more important plant food) from an insoluble condition and makes it available to the plant. In addition to all these functions, lime binds up the particles of a loose soil and thus increases its moisture holding capacity. In a clayey soil it encourages the formation of what is known as "Compound Particles" which help to reduce the impermeability of the stiff clay.

Generally most soils contain adequate amounts of lime and so stand in no need of liming. But sour or acid soils and peaty soils (soils rich in undecayed organic matter) will be greatly benefited by liming. Soils that have become deficient in lime, due to severe and continuous leaching by heavy rains will also stand in need of liming.

Question No. 3.

Which elements are considered to be the most essential for plant growth ?

Answer:

The most essential plant foods are nitrogen, phosphorus, potassium, calcium, carbon, hydrogen, oxygen, sulphur, iron and magnesium. In addition to these there are some more elements that are usually found in plants and these are sodium, chlorine, silicon, boron, manganese, etc. Elements such as copper, zinc, lead and even silver and gold are sometimes found among plant tissues; but these are styled as trace elements and from agricultural point of view these are not important. The health of the crop depends mainly on the availability of all these various elements. Of all these elements the first three, namely, nitrogen, phosphorus and potassium are considered the most important, for the simple reason, that they are needed in fairly large quantities and they have very important effects on plant growth. The farmer's chief worry is to supply these (the Big Three) in optimum quantities. Nitrogen defficiency leads to poor yield. sickly stunted growth of the crop, pale green leaves and ultimate defoliation. Phosphorus deficiency results in poor root-development, decreased flowering capacity and very low grain yield. Lack of potash weakens the crop and lowers its resistance to insect-attacks and diseases.

Question No. 4.

Can you prescribe a remedial measure for the attack of .white ants ?

Answer:

White ants or termites can do a lot of damage if proper attention is not paid at the initial stages of attack. These white ants give trouble particularly in loose sandy soils and high level garden lands. Sugarcane, tapioca and other similar long-standing crops are usually attacked by these termites. To eradicate them a dilute emulsion of crude oil can be used and it is very effective. Treat the attacked plants with this solution kept in a watering can. Tar emulsion also may be tried.

Question No. 5.

What can we do to stop the stem bleeding disease of coconut ?

Answer:

This is a common disease and is caused by a fungus, named Thielaviopsis paradoxa. At first the coconut stem develops brown patches on the bark, which later on splits and from the slit a reddish brown liquid oozes out. This is a weakening disease, and if ignored may kill the tree ultimately. To put a stop to this bleeding, the affected part must be cleanly cut off with a sharp knife or chisel and then hot tar must be applied over the cut surface.

AVIATION NEWS OF IMPORTANCE

HINDUSTAN AIRCRAFT LTD.

In spite of the Government's desire to put the Hindustan Aircraft Ltd., on a full production footing, concrete steps to achieve this have been delayed due to the preoccupation of the Government with constitutional problems. It is understood that a provisional programme of work is being prepared for the factory pending the decision of the Government of India on the production of military aircraft for our air force.

It is understood that the Board of Directors have decided that as an interim arrangement, the factory should take up the manufacture of railway coaches and pre-fabricated houses. There is no doubt that the factory will be used for the manufacture of military planes and the requirement of civil aviation will form only a fraction of the total demand. The Board of Directors have decided to establish a separate design section. This decision, though belated is to be welcomed The U. K. Aircraft Mission had laid great emphasis on the necessity of evolving original designs for the production of aircraft suited to Indian conditions.

COLOMBO AND MADRAS AIR SERVICE.

As a result of discussions between the Director of Civil Aviation and the Air-India Ltd., a tentative agreement has been reached with the Ceylon Government on most of the technical points relating to the operation by Ceylon's State-owned "Air Ceylon" of thrice-a-week two-way shuttle Air Service between Colombo and Madras. The service is expected to be inaugurated shortly.

AIRCRAFT INSTITUTE FOR MYSORE PROPOSED.

A proposal to start an Institute of Aircraft Technology in Mysore on the lines of Mile's Aircraft Technical Institute, London, has been made by the Mysore Provincial Board of the All-India Manufacturers' Organisation to the Industries Committee of the Mysore Economic Conference for their examination and recommendation to the Government.

AIRLINES FLY 23 MILLION MILES IN YEAR.

In the last 15 months, there has not been one fatal accident on regular passenger Air Services in Australia. In the business year just ended, there were only five accidents on regular services and no one was injured In the last 12 months Australia's Airlines flew approximately 23,000,000 miles and carried 860,000 passengers. In 1942-43, the previous fatality-free year, airlines flew 7,000,000 miles and carried 137,000 passengers.

SILENT SPRITE.

A new two-place all-magnesium structure personal plane, the Sprite, announced by Essex Aero Ltd., Gravesend, England, is designed to

have the noise level of a passenger automobile, the manufacturer has announced. Mounting for the 100-hp. Nuffield Engine is incorporated with the cowling; a patented reduction gearing is provided for slower turning of the propeller, together with a "tuned" muffler system. A two-blade propeller to be used first, will be replaced by a multi-blade propeller when it is available, the manufacturer states. In addition to its magnesium alloy skin and structure, the plane has other interesting features including a Vee-tail, a crash arch reinforcement in the cabin roof, and a safety harness which "does not restrict normal movements of the occupants" Cruising speed of 130·5 mph. and range of approximately 700 mi. is estimated for the plane which has not flown.

EXPLOSION-PROOF ELECTRICAL EQUIPMENT FOR AIRCRAFT.

General Electric Co. has developed what it terms explosion-proof electric equipment for aircraft by redesigning enclosures for electric motors and controls generally located in wings or engine nacelles.

The new enclosures are equipped with venting windows covered with a porous material which permits the escape of gases which are generally locked in conventional enclosures and constitute a fire hazard. According to GE, enclosures having vents or openings have not been generally used because of the fragile nature of metal screen generally employed.

However, the GE-designed enclosures utilize metal of sufficient strength but which still has tiny perforations through which the gases can pass.

MARTIN 2-0-2.

The Martin 2-0-2, 40-passenger twin engine airliner, has been approved by the Civil Aeronautics Administration for Airline Service, it was announced here today by Glenn L. Martin, President of the Glenn L. Martin Company. The 2-0-2 thus becomes the first postwar twin engine airliner to be certified for use on the Airlines.

FASTER AIR SERVICE TO INDIA.

A speed-up of some BOAC London-Karachi daily air service and the weekly London-Colombo air service by the use of new routes and new aircraft have taken effect recently.

Avro York planes replace Handley Page Halton aircraft on two routes. The London - Colombo journey will be reduced by 24 hours to two-and-a-quarter days, and the time for the London-Karachi service is 36 hours.

Four of the services each week continue on through Karachi to Delhi and Calcutta, and the flying boat and Lancastrian Services through Pakistan and India to the Far East and Australia remain unchanged.

NEWS & NOTES .... in brief

F. A. C. T. NEWS

WEDDINGS

The marriage of Mr T. C. Gopinathan took place with Sri. Lakshmikutty at Ernakulam on Sunday the 14th Sept. 1947.

The marriage of Mr. K. A. Varugis took place with Miss Saramma Jacob at the Christ Church, Trivandrum, on Monday the 1st Sept. 1947.

We offer our hearty falicitations and congratulations to the new couples.

FAREWELL

Our personnel miss very much from their midst Mr. K. R. Anantharaman, who was actively connected with the construction of this factory which is evident from the several parties held in his honour on the eve of his departure.

Mr. Anantharaman joined this factory as a Project Supervisor, and as a result of his efficient handling of labor and organization of work, was soon promoted to the post of Chief Project Supervisor. With the promotion of Mr V. N. Kasturirangan to the post of Assistant Chief Engineer, Mr. Anantharaman was made the Chief of the Construction and Erection. Mr. Anantharaman is leaving us after the successful conclusion of his assignment.

OBITUARY

We regret to record the sad and untimely demise of Mr. M. J. John, Foreman, Producer Gas Plant, due to heart failure on the night of September 14, 1947. May his soul rest in peace.

The deceased was aged 46 and leaves behind him his old mother, wife and six children to mourn his loss. Our deep and heartfelt condolences to the bereaved family.

GODAVARI SUGAR AND REFINERIES LTD.

We understand that a limited Company called Godavari Sugar and Refineries, Ltd., will be floated shortly in South India, with an authorised capital of Rs 20 lakhs and an issued capital of Rs. 15 lakhs. The Company proposes to erect the factory at Tanuku in West Godavari District, and is intended to carry on combined operations of cane crushing and *gur* refining. The factory has, we learn, all the facilities needed, including the supply of raw materials. The sponsors of the Company, who include, among others, well-known Andhra businessmen like Mr. K V. Subba Rao and Mr. D Pracasa Rao, have been able to secure the necessary plant and hope that the factory would commence production by the end of this year. In the initial stages, the factory is expected to crush about 200 tons of cane and to refine 40 tons of jaggery per day, producing about 8,000 tons of sugar per annum.

WORLD FERTILISER PRODUCTION.

From the world point of view, it is understood, fertilisers are still very scarce. They continue to be strictly rationed out to the various countries by the International Emergency Food Committee which has its head quarters in Washington.

All nations have themselves imposed restrictions to guarantee as fair and equitable a distribution as possible. In Britain, for instance, no official sanction is given to a ferti-

liser for anything but food production. Neither the board of trade nor the Ministry of Agriculture will countenance the use of a fertiliser that is in short supply for flowers or sports grounds for millions of people the world over are still hungry and they must come first.

Egypt has proposed to build a factory within the next two years which will turn out between 200,000 to 300,000 of artificial manure a year.

RAMAPADASAGAR PROJECT

A definite stage has been reached in regard to the proposed construction of the Ramapadasagar project. The Designs Engineer, who has been specially deputed to America by Government is expected to return to Madras with the plans shortly. The present estimated cost of the project is rupees 80 crores. The Government of India, it is understood have undertaken to bear one half the cost of the unproductive expenditure. The construction is likely to begin in a year.

INTERNAL COMBUSTION ENGINEERING

A meeting of the Governing Body of the Council of Industrial and Scientific Research was held recently at New Delhi. Pandit Jawaharlal Nehru, Prime Minister of India, presided.

Addressing the Governing Body, Pandit Nehru said: "Before long we shall consider planning in various forms and then your advice would be valuable. We shall have to go at a fairly faster speed. After a big change we have to face a large number of problems".

The council sanctioned schemes of research involving a total expenditure of Rs. 83,700.

It was decided to establish a National Internal Combustion Engineering Laboratory. Fifteen students will be sent abroad for advanced study and training in internal combustion engineering in order to meet the needs of the National Laboratory, industries and Technological Institutes.

The Council also recommended a grant of Rs. 2.25 lakhs to the Indian Institute of Science, Bangalore, for the training of personnel in internal combustion engines and for long-range research in the field. The setting up of an Indian Aircraft Establishment and an Internal Combustion Engine Development Board was recommended by the Council.

The Council decided to bring out a monograph of Indian medicinal plant and a popular edition of the monograph on aromatic plants of India.

A grant of Rs. 3 lakhs was sanctioned for the Research Institute of the Indian Academy of Sciences, Bangalore, for physical and chemical investigations of the minerals of India under the direction of Sir C. V. Raman.

INDIAN INSTITUTE OF SCIENCE

The Indian Institute of Science, Bangalore, has placed orders with several firms in Britain and the U. S. A. for equipment required for a hiph-power voltage engineering laboratory to be constructed at a cost of Rs. 1,40,00,000. Mr. Kenneth Aston, Special Officer, is shortly leaving for Britain and the U. S. A. in order to discuss details of the design and specifications of apparatus with the firms' engineers, as also to expedite the execution of the orders. He will take advantage of his stay abroad to visit foreign laboratories and study the methods employed there. The installation of the new equipment at Bangalore will be completed in two years.

PHOSPHATE OUTPUT VITAL TO FOOD PLANS

Production of phosphates from Nauru and Ocean Islands is being stepped up by the installation of new machinery. By the end of this year, it is expected that Australian and New Zealand farmers will be receiving double the quantities of super-phosphates now available.

For the year ended June 30, output was 220,000 tons of phosphate. It is expected that this will be trebled in the next 12 months.

NEW AUSTRALIAN BAUXITE FIELD

Encouraging results have been received from a New Australian search for bauxite in the State of Queensland. Recent Geological surveys reveal that potentially the most important deposits so far discovered in the State occur in the South Burnett District. Favourable indications of large deposits of commercial grade bauxite suggest immediate prospecting of the area.

MORE ELECTRIC POWER FOR INDUSTRY

In order to keep pace with increasing industrial needs and domestic consumption, Australia is planning for further supplies of electric power in all states. At the end of 1946, Australia's installed capacity of generating plant was 1,964,500 kilowatts, of which 1,617,800 kilowatts was by steam power, 265,400 kilowatts by water power, and 81,300 kilowatts from oil and internal combustion engines. It is estimated that 2,715,500 tons of black coal and 3,586,000 tons of brown coal were consumed in generating electricity during 1946.

KNITTING MACHINE FOR POWER CABLES

An unusual machanism of technical interest is a machine which knits insulated covering for power cables. It was demonstrated at a recent "Australia Makes It" exhibition in Melbourne.

PLASTIC FACTORY FOR BANGALORE

A plastic factory is to be started in Bangalore. A 25 lakhs of rupees scheme in this behalf has been sanctioned by the Government of Mysore.

FACTS THAT INTEREST

ALUMINIUM FROM COMMON CLAY:.

Aluminum, 99.8 percent pure, is being produced from common clay in a pilot plant of the National Bureau of standards in Washington, D. C , largest research institute of the United States Government.

The search for the new process began early in 1942 when enemy submarines in the Caribbean Sea threatened the imports of bauxite from the other American Republics on which America's Aluminum Industry depended. Domestic supplies of bauxite ore, low in silica content, rich in the intermediary product alumina, had never covered more than 70 per cent of the prewar requirements. Attempts to utilise clay had failed partly because of chemical shortcomings and partly because of high costs.

After many years of intensive research, two methods were found for the recovery of aluminum from clay. An alkaline extraction process with a solution containing sodium hydroxide and sodium chloride, was abandoned, when bauxite imports revived The second method which was perfected, is a hydrochloric acid extraction process, improving on the previous unsuccessful attempts.

The acid extraction is the first and only successful method to overcome the corrosion of metallic equipment by acid fumes, and the abrasive effect of precipitated aluminum chloride crystals, largely responsible for the failure of earlier research. The pilot plant eliminates these shortcomings by using plastics, glass (for piping) and refractory materials instead of metals. Cost reduction is expected from re-use of hydrochloric acid, from a better utilization of fuel and power and from the sale of by-products.

PRODUCER GAS AS MOTOR FUEL.

Mixtures of producer gas and rectified spirit have been found to result in the mitigation of the many serious disadvantages in the use of producer gas as motor fuel. The April issue of the Journal of Scientific and Industrial Research contains an article on the investigations made in this connection.

One of the disadvantages of operating motor vehicles on producer gas is that the maximum output of the engine under the best conditions is limited to abcut 10 to 60 per cent of that obtained with petrol. This not only adversely effects acceleration and pick up, but also reduces pay load and hence the earning capacity of the vehicle. At the suggestion of the U. P. Government, investigations on the use of rectified spirit for enriching producer gas were conducted at the laboratories of the Council of Scientific and Industrial Research.

The first set of the road tests shows that with a suitably modified carburation system it is possible to run the engine with gas-spirit mixtures without fuel oconomy being impaired. The power of the engine can be boosted up from 47 per cent to 8: per cent. It is shown that any type of petrol engine fitted with any type of carburettor and gas plant can, with minor alterations, be converted for saisfactory operation over a wide-range of producer gas-rectified spirit mixtures.

"BERRY" BRICK FACTORIES FOR INDIA.

The famous "Berry" brick, noted for its terrific crushing power, and imperviousness to all climatic conditions, is shortly to be manufactured in India on a large scale in order to ease the acute building material shortage in many parts of the country. Plant for the purpose, specially imported from England, will soon be installed in Bombay, Calcutta and other large centres.

NEOPRENE-INDUSTRIAL USE.

Neoprene (polymer of chloroprene) had been in commercial use in America for ten years prior to Pearl Harbor and would have been immediately useful to the chemical industry had it not been for restrictions imposed upon its distribution Neoprene was one of the first five materials (four were metals) placed on allocation.

Neoprene closely resembles soft vulcanized natural rubber in physical properties and accordingly can be used where the physical characteristics of natural rubber are required. Neoprene has been used in many places in chemical plants where its chemical properties were not required. Rubber-covered squeeze rolls are a good example; Neoprene was used because GR-S compositions having the desired strength and toughness could not be commercially produced in a hardness below 40 Durometer. However, recent advances in compounding technique have improved the properties of such compositions Numerous other examples include gaskets and soft molded parts.

Neoprene possesses very favourable properties that make it very useful in industries. It has been most valuable for its resistance to allphatic hydrocarbons. The adhesives used to bond neoprene to steel also show good heat stability.

One of the chief uses has been in belting for conveying materials. In one case, neoprene-impregnated glass cloth belting has been reported as being used for handling a chemical (not identified) at 300 deg. F. Considerable flexing and contact with oil was involved. Rubber-covered cotton belts lasted six weeks but most of the neoprene-glass belts showed a service life of seven months.

RESEARCH IN SCIENCE.

The special committee appointed by the Scientific Man Power Committee of the Government of India with Sir S. S. Bhatnagar as Chairman have made a number of long term recommendations.

Maintaining that the question of providing expanded facilities for the training of personnel in scientific and industrial research is closely linked up with the general question of organisation and development of scientific research in the country, the Committee recommends the following measures for immediate adoption: (1) Levy of a statutory cess (1/16 of 1% on industry on the basis of industrial production or a small surcharge on income-tax so as to realise at least one crore of rupees for supplementing the grant from the Government for research: (2) Block grant of six crores of rupees from the Government (spread over a period of five years) for the establishment of various national laboratories and for providing funds to Universities and special institutions for research in all the sciences and technologies; and (3) An annual recurring grant of one crore of rupees from the Government for ensuring the continuity of research activities on a progressive scale. The Committee points out that the principle of levying cess on industry has already been accepted by the Government in the late Planning and Development Department.

In order to overcome the deplorable state of unsuitable employment in which Indian Scientists and Technologists are known to suffer from, the Committee recommends a system of keeping a register of all employable technical personnel. The Committee further urges the creation of a Scientific Service equal in status and emoluments with the Administrative Services similar to that created in Great Britain. It also recommends a few changes in the administrative procedure, which would ensure expeditious work and a greater measure of administrative freedom and initiative for scientists in the matter of appointments, spending, etc.

SHORT-TERM PROPOSALS.

Among the number of short-term proposals made by the Committee in this connecton, special mention may be made of a scheme of Railway Scientific Research for the training of about 200 workers. The Indian Railways possess sufficient facilities for this scheme, observes the Committee, which suggests that a grant of Rs. 3·42 lakhs recurring, may be sanctioned for the purpose.

While dealing with the subject of Industrial Training, the Committee favours the introduction of suitable legislative measures whereby industrial concerns may be obliged to provide technical training for qualified students whether the personnel thus trained are required by the particular concerns or not. A similar obligation must be imposed on purchasers of industrial machinery. The short-term programme includes advanced training to 300 men in 24 major industries at an estimated cost of Rs. 3.6 lakhs recurring, and foremanship training to 500 men at an estimated cost of Rs. 4.6 lakhs recurring.

(ചെറുകഥ).

ശേഷം ജീവിതം

(സി. കെ. എസ്സ്. നായർ)

അതു് ആർക്കും അറിയാം—4 മണിക്കുള്ള കമ്പനിയിലെ നീണ്ട ചൂളംവിളിയാണതെന്നു്. സമയം വൈകുമല്ലോ എന്ന വിചാരം അവനിൽ അതിയായ പരിഭ്രമം ഉളവാക്കി. ആ വളഞ്ഞ വരമ്പിലൂടെ അവൻ പാടം കടന്നു. കടത്തുവള്ളം കാത്തു കിടന്നിരുന്നു. പുഴ കടന്ന കൊച്ചുണ്ണി തിടുക്കത്തിൽ നടന്നു. പണികഴിഞ്ഞു്, പുഴപോലെ വഴിയെ പ്രവഹിക്കുന്ന തൊഴിലാളികളിൽ പലരും പകലെ പുറപ്പെടാത്തതിനു് കൊച്ചുണ്ണിയെ പഴിച്ചു. തിരിഞ്ഞുനിന്നു് ഉത്തരം പറയാനാകാതെ മൂന്നാം ഷിഫ്റ്റിൽ പണിയെടുക്കാൻ പാവപ്പെട്ട ആ കൂലിക്കാരൻ കമ്പനിപ്പടിയ്ക്കലെത്തി. കിതച്ചുപതറി "ടൈം" ആഫീസു് ജനാലക്കുള്ളിലേക്കു് അവനൊന്നു നോക്കി. ഒരു കടലാസിൽ അവന്റെ നമ്പറും എഴുതപ്പെട്ടു. ടോക്കൺ കിട്ടിയതും അവൻ പ്രവൃത്തിസ്ഥലത്തെത്തിയതും ഒരുമിച്ചു കഴിഞ്ഞു.

കൊച്ചുണ്ണിയുടെ ഉറച്ച ശരീരം ഒരു സാധുവായ കുടുംബത്തിന്റെ സംരക്ഷണായന്ത്രമാണു്. വയസ്സുചെന്ന അവന്റെ ജനനിയും സരളയായ ഭാര്യയും, പിഞ്ചുപൈതങ്ങളും രണ്ടനുജന്മാരും കൊച്ചുണ്ണിയുടെ പ്രയത്നഫലം മാത്രം അനുഭവിച്ചു കഴിയുന്നവരാണു്. വീട്ടിലെ കോഴിക്കും കന്നുകാലിക്കും കൊച്ചുണ്ണിയുടെ സമ്പാദ്യം ആവശ്യമാണു്.

മുപ്പത്തിരണ്ടു വയസ്സു്, കുറുകി തടിച്ച ശരീരം, താടി വളർത്തി മുട്ടയടിച്ച തല, വെട്ടിയൊതുക്കി മിനുക്കി വച്ച മേൽമീശ, ഇവയാണു് കൊച്ചുണ്ണിയെ കാണുന്ന ഒരുവന്റെ ദൃഷ്ടിയിൽ ആദ്യമായി പതിയുന്നതു്. മിക്കപ്പോഴും മീശയുടെ താഴെ അഗ്നിസ്ഫുരണവും മീശക്കിടയിൽക്കൂടി 'കുമുകുമാ' എന്നുള്ള ധൂമപ്രവാഹവും കാണാം—അതു് അവനു് ഒരു വലിയ സുഖമാണത്രെ!

കമ്പനിയിൽ അന്നു ധാരാളം വിറകു്, ബാർജിലും വള്ളത്തിലുമായി വന്നിരുന്നു. മഴയിൽ നനഞ്ഞു വിറച്ച ജോലിക്കാർ വിറകു് ലോറികളിലാക്കി 'സോമില്ലിൽ' എത്തിച്ചുകൊണ്ടിരുന്നു. "എപ്പോഴും സൂക്ഷിച്ചു പ്രവൃത്തി ചെയ്യണം" എന്ന വാക്കു് കമ്പനിയിലെ ഓരോ ശബ്ദവും പ്രതിധ്വനിപ്പിച്ചിരുന്നു. ഭാഗ്യമൊ വിധിയൊ, അന്നു് കൊച്ചുണ്ണിയും "സോമില്ലി"ൽ വിറകു മുറിക്കുന്ന ഒരു വേലക്കാരനായിരുന്നു. അവനും കൂട്ടുകാരും തടികൾ മറിച്ചു മറിച്ചു് തള്ളിക്കൊണ്ടേയിരുന്നു. "എപ്പോ

ഴം നിങ്ങളുടെ രക്ഷയെ മുൻനിറുത്തി പണി ചെയ്യണം" എന്ന് സൂപ്പർവൈസർ വിളിച്ചുപറഞ്ഞു. ആയിരം ചിവിട്ടുകൾ ഒരുമിച്ചുണ്ടാകുന്ന ശബ്ദമാണ് "സോമില്ലി"ൽ കേൾക്കുന്നത്. വിറക് മുറിക്കുമ്പോൾ ശബ്ദം ശതഗുണീഭവിക്കും. പണിയെടുക്കുമ്പോൾ കൂട്ടുകാരുടെ സംഭാഷണം നല്ലവണ്ണം ശ്രദ്ധിച്ചാൽ കേൾക്കാം.

നാരായണൻ:— ഇതെന്തു പാടാണ്, പൊന്നേ! ഈ അർദ്ധരാത്രി മഴയത്തും പണിയെടുക്കണമെന്ന് വന്നാൽ—

ജോസഫ്:— വെറുതെയാണോടാ! കമ്പനി പണം തന്നിട്ടല്ലേ? ഇതില്ലായിരുന്നെങ്കിൽ അപ്പോഴറിയാമായിരുന്നു. ഇപ്പോഴെന്താ തരക്കേട്? തൊഴിലാളികൾക്ക് വേണ്ട എല്ലാ സൌകര്യങ്ങളും കമ്പനി ചെയ്തുതരുന്നുണ്ട്.

നാരായണൻ:— വല്ല മുട്ടീടെ മൂലേലും ഒന്നു തട്ടി "ആക്സിഡൻറ്" ലീവെടുത്തു വീട്ടിൽ പോകാമോ? അതാണ് മിടുക്ക്.

ജോസഫ്:— എടോ! അങ്ങിനെ അപകടങ്ങൾ ഉണ്ടാകാതിരിപ്പാൻ ഏതെല്ലാം തരത്തിലാണ് കമ്പനി പ്രവൃത്തിക്കുന്നത്? അല്പമൊക്കെ നമ്മളും സൂക്ഷിച്ചാൽ, നമുക്കും നമ്മളെ പോററിപ്പുലർത്തുന്ന കമ്പനിക്കും വളരെ പണവും സമയവും ലാഭമുണ്ട്.

നാരായണൻ:— ഏതായാലും കൊച്ചുണ്ണി! നീ അങ്ങു മാറിനിന്നൊ! ഒരു തടി മുറിക്കാൻ നമ്മൾ മൂന്നുപേരും നിരന്ന് നിൽക്കണ്ട. അറത്തു വീഴണ തടിയെ പിടിക്കേണ്ട ആവശ്യമില്ല. അയ്യോ! ആ വാളെങ്ങാനൊന്നു പാളിയാൽ....

പാവപ്പെട്ട കൊച്ചുണ്ണിയുടെ മനസ്സ് അവൻെറ വീട്ടിലും, കൈകൾ മുറിഞ്ഞു വീഴാറായ തടിയിലും ആയിരുന്നു.

പെട്ടെന്ന് ഒരു ഞെട്ടൽ—ഒരു മുറവിളി. അവിടെ നിന്നവരിൽ പലരുടേയും തല കറങ്ങി; കണ്ണ് ഇരുട്ടിച്ചു. കൊച്ചുണ്ണിയുടെ ഒരു കയ്യിൽ നിന്നും രക്തം ധാരധാരയായി പ്രവഹിച്ചു. സാധുവിൻെറ രോദനം 'സോമില്ലി'ൻെറ ഇരമ്പലിനു മുകളിൽ കേൾക്കാമായിരുന്നു.

ആകസ്മികമായുണ്ടായ ഈ സംഭവം കൊച്ചുണ്ണിയുടെ വീട്ടിൽ ഒരു ഇടിവെട്ടുണ്ടാക്കി. കമ്പനി 'ടെലഫോൺ' പചയിടത്തും മണികിലുക്കി. മേലുദ്യോഗസ്ഥന്മാർ അമ്പരന്നു. ഇത്രയൊക്കെ രക്ഷാനടപടികൾ കൈക്കൊണ്ടിട്ടും അല്പം ഉദാസീനത ഘോരവിപത്തുകൾ വരുത്തുമെന്ന് ഇനിയും തൊഴിലാളികൾ അറിയുന്നില്ലല്ലൊ എന്നായിരുന്നു അവരുടെ ആശ്ചര്യം.

ഇടതുകയ്യിൻെറ തള്ളവിരൽ, ചൂണ്ടുവിരൽ-ഇവ മാത്രമെ കൊച്ചുണ്ണിക്ക് ബാക്കി കിട്ടിയുള്ളു. അവൻ വേദനയെടുത്ത് മറിയുന്നു; കമ്പനിയിൽനിന്നും അവന് ഇനിയും പണം കൊടുക്കുന്നു. ചികിത്സക്ക് ധാരാളം പണം കമ്പനിതന്നെ ചിലവാക്കി. പക്ഷെ, അവൻെറ ശേഷം ജീവിതം..........? വിരലുകൾ ഇല്ലാത്ത ആ ജീവിതം.........?

സൂക്ഷിച്ചു പ്രവർത്തി ചെയ്യുക, ഘോരാപത്തുകൾ തടയുക-എങ്കിൽ നവയുഗത്തിൽ ആപത്തുകളിൽ നിന്നും നമുക്ക് സ്വതന്ത്രരാകാം.

വൃത്താന്തസംഗ്രഹം.

ഭക്ഷ്യധാന്യ പ്രശ്നങ്ങൾ—ഇന്ത്യാ ഗവമ്മെൻറു് കമ്മററി നിയമിക്കുന്നു.

ഉൽപ്പാദനം, സംഭരണം, ഇറക്കുമതി, വിതരണം, നിയന്ത്രണം എന്നിവ മുൻനിർത്തി ഇന്ത്യയിൽ ഭക്ഷ്യധാന്യം സംബന്ധിച്ചു് ഇന്നത്തെ നിലയും അടുത്ത അഞ്ചു കൊല്ലത്തേയ്ക്കുണ്ടാകാവുന്ന നിലയും പരിശോധിക്കുന്നതിനും, ഗവമ്മെൻറിനെ ഉപദേശിക്കുന്നതിനും, അഭ്യന്തരമായ സംഭരണവും ഉൽപ്പാദനവും സംബന്ധിച്ചു് വേണ്ട നടപടികൾ നിർദ്ദേശിക്കുന്നതിനും ഇന്ത്യാഗവമ്മെൻറു് ഒരു കമ്മററി നിയമിച്ചിരിക്കുന്നു.

61 ലക്ഷം പറ നെല്ലു്—ഇക്കൊല്ലം കൊച്ചിയിലെടുത്തു.

നെല്ലെടുപ്പു സംബന്ധിച്ചു് ചില തൽപ്പരകക്ഷികൾ പുറപ്പെടുവിച്ചിട്ടുള്ള ഒരു ലഘുലേഖയെ സംബന്ധിച്ചുകൊണ്ടു് ഗവമ്മെൻറു് പുറപ്പെടുവിച്ചിരിക്കുന്ന ഒരു പ്രസ്താവനയിൽ ഒരു ഭാഗത്തു് ഇപ്രകാരം പറയുന്നു:— 1121-ൽ ദേവസ്വത്തിൽ നിന്നും 4700 പറ നെല്ലു മാത്രമെ കിട്ടിയുള്ളൂ. 1122-ൽ കർക്കടകം 25 വരെ 82000 പറ നെല്ലാണു് എടുക്കുവാൻ സാധിച്ചതു്. ഗവമ്മെൻറിനു് 1121-ൽ ആകെ എടുക്കുവാൻ സാധിച്ച നെല്ലു് 2992956 പറയായിരുന്നു. 1122-ൽ കർക്കടകം 6-ാം തീയതി വരെ കിട്ടിയതു് 6156350 പറയാണു്.

റേഷൻ വ്യാപാരികൾക്കു് ഉഴുന്നും പയറും.

തിരുവിതാംകൂറിൽ ഉഴുന്നും പയറും എല്ലാ റേഷൻകാർഡു് ഉടമസ്ഥന്മാക്കും ലഭിക്കത്തക്കവണ്ണം വിതരണം ചെയ്യുന്നതിനും എല്ലാ കച്ചവടക്കാക്കും റൊട്ടേഷൻ അനുസരിച്ചു് കിട്ടത്തക്കവണ്ണം സ്റ്റോക്കു് നല്കുന്നതിനു് ഏപ്പാടു ചെയ്യണമെന്നും കാണിച്ചു് എല്ലാ റേഷൻ ആഫീസരേയും തെയ്യപ്പെടുത്തിക്കൊണ്ടു സിവിൽസപ്ലൈസ് കമ്മീഷണർ സക്കുലർ പുറപ്പെടുവിച്ചിരിക്കുന്നു.

കൊച്ചിയുറമുഖത്തെ വ്യാപാരം.

ഇക്കഴിഞ്ഞ മാർച്ചുമാസത്തോടുകൂടി അവസാനിച്ച ഒരു വർഷത്തിൽ കൊച്ചി യുറമുഖത്തു 543 കപ്പലുകൾ അടുത്തു് കയററിറക്കുമതി നടത്തിയിട്ടുള്ളതായി കണക്കാക്കിയിരിക്കുന്നു. ഇതു് തലേവഷത്തിൽ 494 കപ്പലുകൾ മാത്രമായിരുന്നു.

കൊച്ചിത്തുറമുഖ കയററിറക്കുമതി കഴിഞ്ഞ ഒരു വഷം വളരെ വധിച്ചിരിക്കുന്നു. 9,70,312 ടൺ ഇറക്കുമതിയും, 3,41,116 ടൺ കയററുമതിയും കൂടി ആകെ 13,11,428 ടണ്ണിൻെറ വ്യാപാരമാണു് നടന്നിട്ടുള്ളതു്. ഇതിൻെറ തലേവഷം നടന്ന കയററിറക്കുമതി 12,91,916 ടണ്ണാണു്.

കുറിപ്പുകൾ.

ഉത്തരവാദിത്വഭരണം

ബ്രിട്ടീഷ് ഇൻഡ്യൻ സ്വാതന്ത്ര്യപ്രസ്ഥാനം അതിന്റെ ഉച്ചത്തിലെത്തിയപ്പോൾ മുതൽ ഇൻഡ്യൻനാട്ടുരാജ്യങ്ങളിലെ ജനകീയപ്രസ്ഥാനവും ശക്തിപ്പെട്ടുവരികയായിരുന്നു. എന്നാൽ ബ്രിട്ടീഷ്ഇൻഡ്യക്ക് സ്വാതന്ത്ര്യം ലഭിച്ചതോടെ ജനകീയപ്രസ്ഥാനം കൂടുതൽ ശക്തിപ്പെട്ടുവരികയും ഉത്തരവാദിത്വഭരണത്തിന്റെ തീക്ഷ്ണത വർദ്ധിക്കുകയും ചെയ്തു. ഇൻഡ്യയിലെ ഇരുഡൊമീനിയനുകളിലേയും ജനത യഥാർത്ഥഅധികാരത്തിലെത്തിയിരിക്കുമ്പോൾ നാട്ടുരാജ്യപ്രജകളുടെമേൽ ഏകശാസനഭരണം അനിഷ്ടസംഭവങ്ങളുണ്ടാക്കുകതന്നെ ചെയ്യും.

പ്രജാവത്സലനായ നമ്മുടെ മഹാരാജാവ് തിരുമനസ്സിലെ കർമ്മകുശലതയും ദീർഘദൃഷ്ടിയും ഒരു വിപ്ലവത്തിൽനിന്നും തിരുവിതാംകൂറിനെ രക്ഷിച്ചു. തിരുവിതാംകൂർ ജനതക്ക് പൂർണ്ണഉത്തരവാദിത്വഭരണം അദ്ദേഹം അനുവദിച്ചുകൊടുത്തു.. അങ്ങിനെ, തിരുവിതാംകൂറിലെ രാഷ്ട്രീയസ്ഥിതി, പ്രക്ഷുബ്ധതയിൽനിന്നും പ്രശാന്തതയിലേക്കും പ്രസന്നതയിലേക്കും മാറിക്കൊണ്ടിരിക്കുന്നു.

ഉത്തരവാദിത്വഭരണത്തിന്റെ ആവശ്യകതയെക്കുറിച്ച് ഇക്കാലത്ത് രണ്ടഭിപ്രായങ്ങൾക്ക് കാരണമില്ല. ഗവർമെൻറും ജനതയും ഒന്നായി നിന്നുകൊണ്ടല്ലാതെ ഒരടിപോലും മുമ്പോട്ടുവെയ്ക്കുവാൻ നിവൃത്തിയില്ലാത്തവിധം അത്രയേറെ ഗൗരവാവഹമായ ഒരു കാലഘട്ടത്തിൽ ലോകം എത്തിയിരിക്കയാണ്. കാർഷികവും വ്യവസായപരവുമായ അഭിവൃദ്ധിക്ക് വേണ്ടതുചെയ്യാൻ ഒരു ജനകീയ ഗവർമെൻറിനേ സാധിക്കയുള്ളു. അനക്ഷരത്വം, തൊഴിലില്ലായ്മ, ഭക്ഷ്യക്ഷാമം ഇവക്ക് പരിഹാരമുണ്ടാക്കുവാൻ ഒരു ഏകാധിപത്യഭരണത്തിനുള്ള അപ്രാപ്തി നാം കണ്ടുകഴിഞ്ഞു. അങ്ങനെ എന്തുകൊണ്ടും തിരുവിതാംകൂർ ഉത്തരവാദിത്വഭരണലബ്ധിമൂലം ശോഭനമായ ഒരു ഭാവിയെ ദർശിച്ചു തുടങ്ങിയിരിക്കുന്നുവെന്ന് നിസ്സംശയം പറയാം.

എന്നാൽ സ്വാതന്ത്ര്യലബ്ധിയോടുകൂടി തദനുസരണമുള്ള ചുമതലകളും ജനങ്ങളുടെ ചുമലിൽ വന്നുചേരുന്നുണ്ടെന്ന് വിസ്മരിക്കാവുന്ന കാര്യമല്ല. ഓരോ ഗ്രാമത്തിന്റെ മൂലയിലും ഇനി ഗവർമെൻറിന്റെ ശ്രദ്ധ പതിയേണ്ടിയിരിക്കുന്നു. ആരോഗ്യം, ശുചിത്വം, സാക്ഷരത്വം ഇവയുടെ കാര്യത്തിൽ ഇൻഡ്യയിലെ ഏതു നാട്ടുംപുറവും വിപ്ലവാത്മകമായ ഒരു പരിവർത്തനത്തിലേക്ക് വരേണ്ടിയിരിക്കുന്നു. സാമാന്യജനങ്ങളുടെ ജീവിതത്തോത് ഉയർത്തുകയും ഓരോ വ്യക്തിക്കും വളരുവാനും വികസിക്കുവാനും സൗകര്യം നൽകുകയും ചെയ്യുന്ന ഒരു വ്യവസ്ഥിതിയ്ക്കേ ഇനിയും നിലനിൽക്കുവാൻ കഴിയൂ. തങ്ങളുടെ പ്രതിനിധികളിലൂടെ അവയെല്ലാം സാധിക്കുന്നതിനുള്ള ഒരു ഭരണക്കൂടം വാർത്തെടുക്കുക എന്ന ഭാരമേറിയ കർത്തവ്യമാണ് ഇന്ന് തിരുവിതാംകൂറിനെ സംബന്ധിച്ചിടത്തോളം അവിടത്തെ ജനങ്ങൾക്കുള്ള

ണ്ട്. സമുദായവിദ്വേഷവും മതദ്വൈരവും മറന്ന് ഒരേ ഒരു ജനത എന്ന നിലയിൽ പ്രവർത്തിച്ചെങ്കിൽ മാത്രമേ അതു സാധിക്കാൻ പോകുന്നുള്ളു.

മഹാരാജാവു് തിരുമനസ്സുകൊണ്ടു് കല്പിച്ചുനൽകിയിട്ടുള്ള ഈ അവസരത്തെ ഇവിടത്തെ ജനസാമാന്യം യഥാർത്ഥ ഉപയോഗപ്പെടുത്തുമെന്നുതന്നെ നമുക്കു് ന്യായമായി പ്രതീക്ഷിക്കാം.

നവഭാരതത്തിൻെറ ചില പ്രധാന പ്രവൃത്തികൾ

ആഗസ്റ്റ് 15–ാംനു- (1947) ന്യൂഡൽഹിയിൽനിന്നും അഖിലേന്ത്യാ റേഡിയൊമുഖേന ഡോക്ടർ രാജേന്ദ്രപ്രസാദ് പ്രക്ഷേപണം ചെയ്ത പ്രഭാഷണം ശ്രദ്ധാർഹമായ ഒന്നാണെന്നു പറയേണ്ടിയിരിക്കുന്നു. ലോകചരിത്രത്തിൽ ഒരു സ്വതന്ത്ര്യരാഷ്ട്രമെന്നവണ്ണം ഉദിച്ചുയർന്നിരിക്കുന്ന നവഭാരതത്തിൻെറ പ്രധാനപ്രവൃത്തികളെന്തെല്ലാമായിരിക്കണമെന്ന് അതിൽ വിശദമായി പ്രസ്താവിച്ചിട്ടുണ്ടു്. ഇവയിൽ ഒന്നു്, ജീവിതത്തിനു് അത്യാവശ്യമായ വസ്തുക്കളുടെ ഉല്പാദനം വർദ്ധിപ്പിക്കുക എന്നതാണു്. ഇക്കഴിഞ്ഞ രണ്ടാം ലോകമഹായുദ്ധത്തിൻെറ അനന്തരഫലമായി ഭാരതത്തിനു് സർവ്വവിധത്തിലുമുള്ള "കുറവു"കളേയും അഭിമുഖീകരിക്കേണ്ടിവന്നിരിക്കുന്നു. ഭക്ഷ്യപദാർത്ഥങ്ങൾ, വസ്ത്രം, ഭവനനിർമ്മാണസാമഗ്രികൾ എന്നു തുടങ്ങിയവയ്ക്കുള്ള ക്ഷാമം ഇന്നു ഭാരതത്തെ ഭയപ്പെടുത്തിക്കൊണ്ടാണിരിക്കുന്നതു്. ഇവയുടെ ഉല്പാദനങ്ങൾ കുറവുണ്ടെന്നു മാത്രമല്ല, ഉല്പാദനത്തിനുള്ള മാർഗ്ഗങ്ങൾതന്നെ നമുക്കില്ലെന്നതാണു് പരിതാപകരമായ പരമാർത്ഥം. ഈ "കുറവു"കളെ പരിഹരിയ്ക്കുന്നതിനുള്ള മാർഗ്ഗങ്ങൾ നടപ്പിൽവരുത്തുക എന്നതു് നവഭാരതത്തിൻെറ ഒരു പ്രധാനകർത്തവ്യമായിട്ടാണിരിക്കുന്നതു്. ഭക്ഷ്യക്ഷാമത്തെ നമ്മുടെ പരിശോധനയ്ക്കു വിഷയമാക്കുന്നതായാൽ ചില വസ്തുതകൾ നമുക്കു മനസ്സിലാക്കുവാൻ സാധിയ്ക്കുന്നതാണു്. ഭക്ഷ്യപദാർത്ഥങ്ങൾക്കു ക്ഷാമമുണ്ടെന്നതു നിസ്സംശയമാണു്. പക്ഷെ അതോടൊപ്പംതന്നെ ഇവയുടെ വിലയും വർദ്ധിച്ചിരിക്കുന്നതാണു് കഷ്ടാൽ കഷ്ടതരമായിട്ടുള്ളതു്. ഭക്ഷ്യവിഭവങ്ങൾക്കുള്ള ക്ഷാമം ഭാരതത്തെ സംബന്ധിച്ചിടത്തോളം 12½ ശതമാനം മാത്രമേയുള്ളു. പക്ഷെ അവയുടെ വില 300 മുതൽ 400 ശതമാനം വരെ വർദ്ധിച്ചിട്ടുണ്ടു്. ഈ അനാശാസ്യനിലയെ പരിഹരിക്കേണ്ടതു് നവഭാരതത്തിൻെറ ഒരു പ്രധാനപ്രവൃത്തിയാണെന്നു് ഡോക്ടർ രാജേന്ദ്രപ്രസാദ് തൻെറ പ്രഭാഷണത്തിൽ ഉൽബോധിപ്പിച്ചിരിക്കുന്നു. ഈ ദുഃസ്ഥിതിയുടെ നിവാരണത്തിനുള്ള പ്രധാനമാർഗ്ഗം ഉല്പാദനത്തിൻെറ സർവ്വതോന്മുഖമായ വർദ്ധനയാണെന്നാണു് അദ്ദേഹത്തിൻെറ അഭിപ്രായം. നമ്മുടെ നിത്യജീവിതത്തിനു് അത്യാവശ്യകരമായ പദാർത്ഥങ്ങളിൽ മിക്കവയും ഇന്നു ലഭിയ്ക്കുവാൻ പ്രയാസമായിട്ടാണിരിയ്ക്കുന്നതു്. അഥവാ, ലഭിക്കുമെങ്കിൽതന്നെ, ക്രമാതീതമായ വില നമുക്കു നൽകേണ്ടിവരുന്നു. ഈ അനാശാസ്യതയെ അകററുന്നതിനു് പല മാർഗ്ഗങ്ങളും നവഭാരതത്തിനു് അവലംബിക്കേണ്ടതായിട്ടുണ്ടു്. നവഭാരതത്തിൻെറ പ്രധാനപ്രവൃത്തികളും ഇവതന്നെയായിരിക്കണമെന്നു് ഡോക്ടർ രാജേന്ദ്രപ്രസാദ് അഭിപ്രായപ്പെട്ടിരിക്കുന്നതു് തികച്ചും ശരിയാണെന്നു് സമ്മതിക്കാതെ തരമില്ല.

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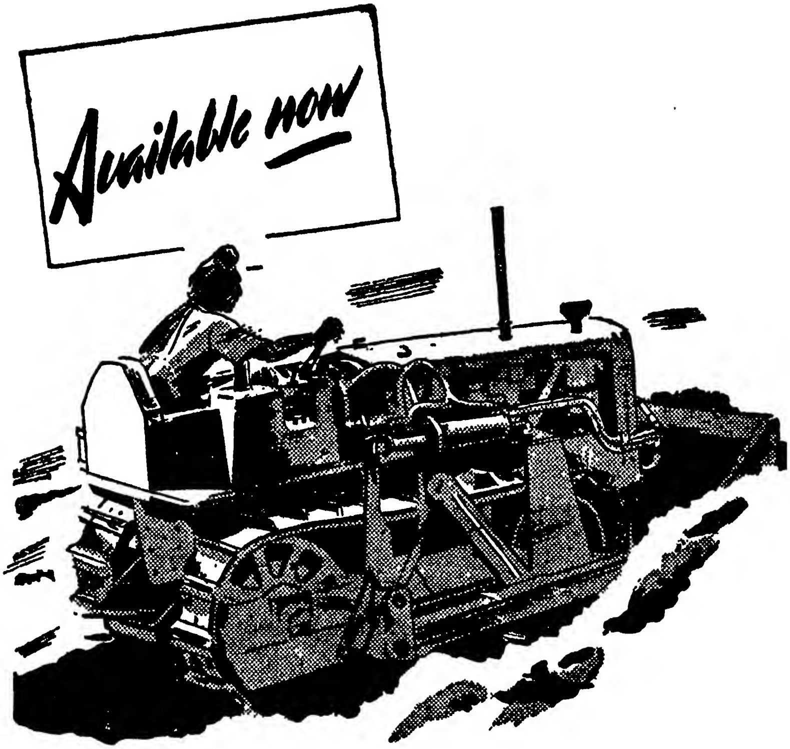
ENGLISH

ON THE COVER PAGE:

The Hon'ble Mr. N. Gopalaswami Ayyangar, Chairman, The Fertilisers & Chemicals, Travancore Ltd. and Minister without Portfolio in the Indian Cabinet.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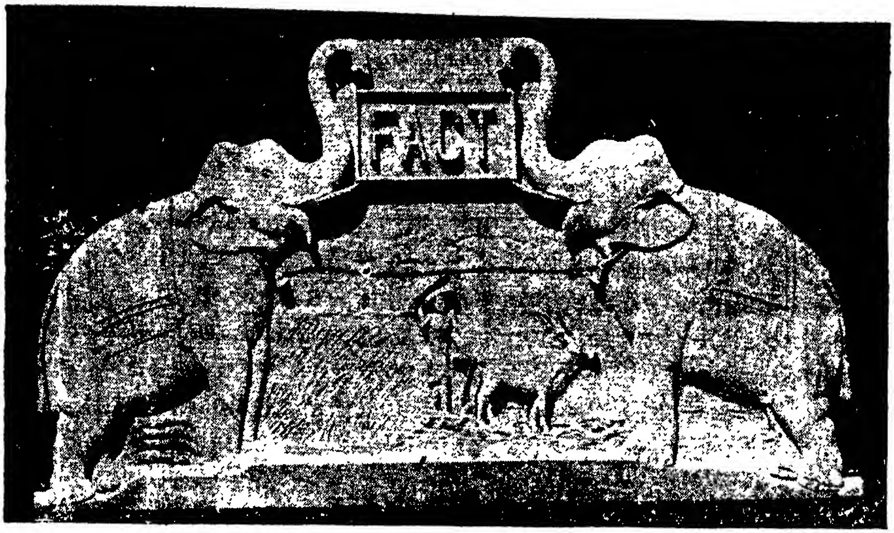

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EDITORIAL

THE Hon'ble Mr. N. Gopalaswami Ayyangar is one of the distinguished administrators of South India now occupying a place in All-India Councils. He was of the batch that passed the last of the provincial Civil Service examinations and entered service about the year 1905. After serving as the head of several districts of the Province, he rose to the office of Inspector of Local Bodies and finally became the First Member of the Board of Revenue. During his service, he earned a reputation for character, firmness, efficiency, drive, thoroughness and independence. After retirement, he accepted the Dewanship of Kashmir, much to the displeasure of the Political Department and administered the State for six years, making it in every way better than what he found it.

Coming out of Kashmir he was elected to the Council of State where he championed national interests with courage and skill. From then on his services have been in constant demand. He played the leading role in drafting the Sapru Constitution and made substantial contribution as Chairman of the Army Indianisation Committee.

But nothing he did in the past could outweigh his work in the drafting of the Union Constitution. The sincerity, devotion and unremitting toil that he brought to bear on the work that was entrusted to him, won for him the confidence and admiration of all the assembled leaders.

With such a record of ability and experience it was in the fitness of things that Mr. Gopalaswami Ayyangar should have been invited to join the Government of India on the attainment of Freedom. And it is a tribute to his qualities that he should have been assigned the grave responsibilities of dealing with the many administrative and security problems created by the present situation in East Punjab. As Minister without Portfolio in the Nehru Cabinet, Mr. Gopalaswami Ayyangar's present role is that of Peacemaker acting as a link between the Government of India and the Government of the East Punjab in the solution of the colossal problem of the Refugees and their Resettlement.

As Chairman of the Fertilisers & Chemicals, Travancore Ltd., Mr. Gopalaswami Ayyangar has played a very important role in the establishment of this premier large scale Fertiliser Industry in India and his appointment as Minister in the first Indian Cabinet is a matter of great pride to us and we take this opportunity to offer him our hearty felicitations.

Editorial Board.

ECONOMICS OF AMMONIUM SULPHATE

The following table shows the imports of Chemical, Fertilisers into India.

Year	Total Imports Tons.	Value in pounds sterling	Value in Rupees	Ammonium Sulphate to Madras Presidency
43–44	40,000	5,60,000	75,00,000	5,350
44–45	70,000	10,50,000	1,40,00,000	27,500
45–46	1,64,000	31,16,000	4,16,00,000	66,300
46–47	1,72,000	32,68,000	4,36,00,000	71,000

The allotment to Madras has been increased from 5000 tons in 43–44 to 71,000 tons in 46–47 and judging from the keen demand, Madras Province requires very much more.

Till now, India has been depending on imports and just now the quantity available for imports is getting less and less and the terms on which we are able to secure same are becoming increasingly onerous.

Just now, the position is reported to be extremely critical, and that the U. K., which was the main source of supply has gone into an austerity programme and is unable and also unwilling to spare the usual quantities of chemical fertilisers to India. Also the U. S. A., wants all its production for home consumption and cannot export any now. Exploratory investigation made at the next best source, the U. S. S. R., shows that the prospect is not quite bright. It is also noticed that the price of chemical fertilisers in the market is on the increase. For example, quantity off-takes are quoted $75 F. O. B., American ports, which will work out to Rs. 350/- per ton landed cost in India.

The commencement of production in FACT at this juncture, is a happy augury, and comes not a minute too late to relieve the critical shortage. FACT is expecting to produce at the rate of 50,000 tons of Ammonium Sulphate and 60,000 tons of Superphosphate per year, which together represent a figure higher than the quota available for Madras Presidency.

FACT has also programmed to increase the production of Superphosphate from 60,000 tons a year to 1,80,000 tons by stages. This production figure is significant when compared with the highest total which has been possible to be imported at any time.

The importance of fertilisers though very well known, will bear repetition. The 50,000 tons of Ammonium Sulphate and 60,000 tons of Superphosphate will straight away give an additional yield of 11 lakhs tons of rice.

There is another aspect to this, namely the commercial or the economic aspect. This can be brought out by an example. One acre of paddy requires an average dose of 112 lbs. of Ammonium Sulphate, which costs Rs. 17/8/-. The yield thereby is increased by at least 1200 lbs. of the value of Rs. 100/- to Rs. 120/-. The return on the investment is thus 7 times or 700 per cent.

There is another aspect of momentous significance, namely, the psychological aspect. This factory proves beyond doubt that Indians are capable of planning and establishing an industry of this magnitude. The process has been proved, and the ability of Indians to establish and run a show of this magnitude has also been proved. Thus, it is no more a matter of speculation or mild scepticism, but an established fact. The way for the Project of Sindhiri and the many other projects that will be required to be established, has been made considerably easy. FACT is the pioneer of the chemical fertiliser industry in India.

It is hoped that other Governments, Industrialists and Ministers who handle industrial portfolios, will take heart from the success of this venture and give a fillip to the speedy achievement of this ideal of self-sufficiency in fertilisers, which will once for all solve the food problem of India and increase the standard of living of the people, and in turn lead to rapid industrialisation and full employment and happiness.

Rendezvous Predestined

After 20 years of childless marriage, the couple's joy knew no bounds when they learned that a baby was on the way. But on the day of the delivery the doctor's heart ached to see that the infant had only a tiny stump for the left arm. He nerved himself to tell the husband and offered to break the news to the mother. No, said the father sturdily, "I want to tell her myself."

Together they placed the swathed baby by the mother's side. She admired the soft petal skin, traced the hairline with her fingers and looked proudly at her husband. "She's perfect, isn't she?"

Something in her husband's eyes warned her. Slowly she removed the blankets and saw the crippled arm. The room was very quiet. Then she turned again to her husband and said softly, "John, the Lord knew just where to send this baby, didn't He? He understood how much we needed her and how much she needs us "

World Aluminium Industry and Travancore's Place in it

BY H. A. ESTABROOK.
INDIAN ALUMINIUM COMPANY, LTD.

ALTHOUGH the earth's crust contains more aluminium than iron or copper or lead, eighty years ago aluminium was more precious than silver or gold - so precious in fact, that Napoleon III of France, a lover of luxuries, ate with aluminium forks and spoons. Some of his guests, being of lower rank had to be content with mere gold utensils. Today even the humblest home uses aluminium utensils.

Although the first metallic aluminum was produced in 1825 by a Danish Scientist, Oersted, it was not until 30 years later when Napolean III saw the possibilities of using this metal to lighten his soldiers' equipment, thereby enabling them to march further and faster, that further development was done on processes to produce it in quantity. Deville, whose efforts the French Emperor financed, succeeded in producing 2 tons in 4 years at a price of about Rs. 70/- per pound.

Other Scientists were now becoming interested in this new light metal and Charles Martin Hall, then a student at Oberlin College in United States conceived the idea that if he could find a liquid in which aluminium oxide would dissolve at a relatively low temperature, he could pass an electric current through the solution and obtain metallic aluminium. On February 23rd, 1886, Hall melted a piece of Cryolite, a mineral which is found only in Greenland, in a small crucible and discovered that aluminium oxide would dissolve in it. When the electric current was turned on, aluminium slowly formed at the bottom of the crucible and at the age of 22 Hall had found the answer to one of Nature's puzzles he had found a way to make aluminium, lots of it, cheaply. Oddly enough at almost the same time, Louis Heroult, a Frenchman discovered the same electrolytic process and neither knew anything of the other's work. Both were of the same age and, in fact, so similar were their destinies that both died within a few months of each other in 1914.

From these humble beginnings the world aluminium industry has grown to a point where it ranks second only to steel in volume of production in the metal industry. In 1943 aluminium was being produced at a rate exceeding three million tons per year.

At the present time, India ranks ninth among the twenty-three world producers of aluminium. World

Extract of a talk recently broadcast by the author from the Trivandrum Broadcasting Stn. — By courtesy of Trm. Broadcasting Stn.

production is divided up roughly as follows:—

United States	...	48%
Canada	...	22%
Russia	...	10%
France	...	8%
Britain	...	5%
Other countries	...	7%

Until the end of the War Germany and Japan were major producers but their light metal industries have had their production curtailed to insignificant amounts by occupation authorities.

The principal factors affecting the location of an aluminium production industry are:—

1) Adequate supplies of good grade bauxite.
2) A dependable supply of cheap electric power.

India is endowed with good grades of bauxite. At the present time our Company is developing deposits at Lohardaga in Bihar and early next year will have a plant in operation for extracting alumina from these bauxites at Muri also located in Bihar. Aluminium Oxide from this plant will be shipped to the reduction plant at Alwaye where vast quantities of electricity from the Pallivasal scheme are consumed in transforming it to the metal aluminium. To produce one ton of aluminium enough electricity is required to keep an ordinary 40 watt electric light bulb burning continuously for seventy years. In addition to that, nine tons of raw materials, chiefly bauxite, petroleum coke, soft pitch, cryolite, aluminium fluoride and smaller amounts of other chemicals are required. The cost of transporting these materials is one of the most difficult probems the Indian Aluminium Industry is confronted with in its efforts to reduce production costs.

Aluminium as you know, is much lighter than other metals, only a third as heavy as iron, steel, copper or brass. Its electrical and heat conductivity, its resistance to corrosion, its reflectivity of heat and light are all qualities which are used in one or more ways in the countless jobs that aluminium does for you. In addition to these qualities is the fact that aluminium is so easily made into all kinds of things. It lends itself to every known process for shaping things from metal. In fact, no other metal can be had in so many different commercial forms as aluminium. It can be melted and poured into moulds of all shapes and kinds. It can be rolled, either hot or cold, into thick plates. flexible sheets, or into foil so thin that ten layers are needed to equal the thickness of newspaper. Or it can be rolled into bars, rods and various other shapes that are used in building trains, planes and ships. It can be drawn out into a wire as fine as a human hair. It can be stranded, like rope, into cables. It can be pressed, stamped, hammered, turned and handled in all the other ways that modern industry employs to make things of metal. It is even "squirted", under terrific pressure,

into the form of the tubes in which your tooth paste and shaving cream come.

Sometimes small amounts of other metals are mixed with aluminium to make it stronger. These mixtures are called aluminium alloys. Copper, silicon, manganese, magnesium and chromium and the metals most commonly used in aluminium alloys. The strength of certain of these can be increased further by heat treatment Many of these heat-treated alloys have the strength of mild steel, and during the War, alloys were developed whose mechanical properties approached those of the best grades of steel. Others are used not so much for their strength as for their greater hardness or because they are easier to work with in certain manufacturing processes. There are ever so many of these aluminium alloys, and they have greatly increased the usefulness of aluminium.

Let us look around and see where aluminium is used. A common misconception exists that most aluminium is used for utensils. Actually in United States only 10% of the metal produced is used in that industry. The transportation industry consumes 35%, the machinery industry 15%, electrical industry 9%, chemical industry 3% building & architecture 7% and other miscellaneous industries use 21%.

You will note from the foregoing figures that the railways, bus and truck lines, automotive companies, steamship companies and air lines use over one-third of all the aluminium produced. The big reason for this is the lightness of aluminium. It is easier to get a light vehicle started in motion and takes less fuel, or energy, to keep it going. It can move faster than a heavy vehicle and it can be stopped more readily.

The electrical industry is another large user. It employs aluminium for carrying electricity from power plants to the user. Many of those "wires" you see looping gracefully from high-voltage towers, and many of those you see strung from poles that carry electricity to farmers are aluminium cables, steel reinforced. This use of aluminium began in 1897, very soon after the cooking utensil industry got started. Some 750,000 miles of this cable has been strung around the country since that time.

In all kinds of manufacturing plants where great electric motors are used, the power is conducted through large bars of aluminium called bus bars. And in the manufacture of electrical apparatus and appliances of all kinds, many of the parts are made of this light, shiny metal.

Let's look at building next. In some cases we will have to dig into the walls to find the aluminium but there is much of it right out in the open exposed to the air, rain, sun and cold. On many office buildings, stores and other fine structures you will often see bright shiny doors of aluminium, handsomely

designed and decoroted. If you look up you may see aluminium spandrels, as they are called, used instead of brick or stone to bridge the space between the top of one window and the bottom of the one above it. The window frames and sills may also be of aluminium. So, too, are the frames around many show windows of stores.

Inside the walls, you may see aluminium conduit carrying the electric wiring to all parts .of the building Also, you may find inside the walls layers of aluminium foil insulation that keep the interior warmer in winter and cooler in summer. And if you scrape away the topcoats of paint on the wood outdoors, you may learn that aluminium paint was used as the first coat. In factory buildings aluminium paint is applied on walls, ceilings, machinery, stacks, water towers etc, in fact almost any place your eye may light, because this paint is so durable, bright aud attractive.

In the chemical industry you will find a great deal of aluminium equipment. It is used to manufacture, store and ship hundreds of different kinds of chemicals. The food industry is a big consumer. Canned foods, bakery products, meats, confections and many other food- stuffs are handled in aluminium pails and trays and prepared in aluminium utensils. The fact that aluminium is friendly to food is just as important in these factory-size kitchens as it is in your own kitchen at home. And so is the fact that aluminium distributes heat quickly and evenly, which means better cooking for less money.

At the present time India has several rolling mills engaged in the production of sheet, most of which is converted into utensils, but some of which is used in the infant aircraft industry. Plants are under construction for the production of ALPaste which forms the basis for what is commonly referred to as aluminium paint.

Another plant is under construction in Kundara for the manufacture of A. C. S. R. cable which is used in building power transmission lines. It is conceivable that with the expanding use of aluminium in India, that the total poduction from the Alwaye plant will be fabricated and consumed in Travancore and adjoining parts of South India providing employment for many thousands of workers.

The price of the aluminium ingot throughout the world is being steadily reduced and at the present time it is 30 per cent less than it was in 1940. Light, strong, and and versatile, aluminium is by all odds the themmetal of the 20th century. All things point to an ever-increasing demand for the metal and Travancore is fortunate in that its far-sighted officials have decided they will share in the building of this new basic industry of India.

FUELS IN TRAVANCORE*

PART II

Rajyasevapravina Dr. K. L. Moudgill,

M. A., D. Sc., F. R. I. C., F. I. A. Sc.,

Director of Research.

IN the first paper on Fuels in Travancore, I had stated that there was little chance of coal being discovered in the State, that the lignite of the Varkalai formation is too poor in burning quality and contains too much ash to be used as a direct fuel, that the fuel wood plantations – largely private - near the town have been getting depleted without replacement and that the resources of the Government forests have not been properly tapped as yet. Much fuel wood of the forests, which annually goes waste because of lack of transport, could be utilised if it could be converted to charcoal. Also it was indicated that it is difficult to exploit a natural forest for fuel wood and that dual purpose trees, for fuel wood and for timber, should be grown in the reafforestation of areas which may be cleared to meet the industrial demands.

In this paper, I shall examine the position of liquid fuels in Travancore. Liquid fuels are required for all air-transport, for most of the road and water transport, for fast-moving machinery, for all military transport, for lightning purposes and, where such modern agricultural practices exist, for tractors, ploughs and harvesting and threshing machines. These fuels are preferred to solid fuels because (1) they are easy to light and the engines can be started instantaneously; (2) the feed can be regulated and, therefore the speed can be varied more easily with quicker response to load; (3) there is not much waste of fuel in starting and warming up and there is little fuel left unburnt in the end; (4) they have a high calorific value; (5) they can be more thoroughly mixed with correct supply of air, so that they give a uniform, smokeless performance and (6) they give little or no ash. For these and other reasons, liquid fuels are an important economic and strategic wealth of a country.

Petrol, kerosene oil, diesel oil, crude oil and furnace oil, all obtained from petroleum by refining, are the common and the most important liquid fuels in the world. We have no petroleum in Travancore; and India as a whole is also very deficient in mineral oils. The annual value of petroleum products imported into Travancore amounts approximately to Rs. One Crore. In peace time this is a heavy drain and in war time it is a potential strangle hold. We have to reduce our dependence upon these imported materials and also to find substitutes of local origin to replace them.

Vegetable and Fish oils are sometimes spoken of as potential substitutes They have been success-

* Based on a broadcast talk given in the Travancore Broadcasting Station on September 4th, 1947, and reproduced with the kind permission of the Director of Broadcasting.

fully used, ***experimentally***, in diesel engines; but their price is too high. They are essential for a number of other uses - for food, as illuminants, as insecticides and for the manufacture of soaps and lubricants. There have been some pathetic endeavours during war time to run motor cars on ground-nut oil, but the planned economy of a developing state cannot be based on such flimsy and fanciful devices.

Products of distillation of coal and, to a lesser extent, of wood have been used in Western countries. Alcohol as a fuel has been rising in importance and is steadily coming to occupy a place second only to petroleum products. The position regarding alcohol is quite promising in Travancore also and may be examined at length.

One hears so much of power alcohol nowadays, and of rectified spirit and methylated spirit that it may be profitable to get some of these distinctions cleared. Alcoholic drinks have been used since ancient times. Potable alcohol or liquor is an article of luxury; even if it is costly, people will still buy it. A high duty is levied on it with a view to raise money for Government revenue and to make drink more and more prohibitive in cost. Potable alcohol contains much water and cannot be burnt.

Alcohol is also used for several industries such as the manufacture of tinctures, paints, varnishes, fine chemicals, dyes and drugs. It is used as a fuel in stoves and lamps. For these purposes, alcohol should not contain much water, and it should be cheap. When distilled, alcohol can be concentrated till it contains only 4 per cent of water. This is known as rectified spirit and is used for industrial purposes. Industries cannot afford to pay the heavy excise duty on alcohol. It is, therefore denatured, or rendered unfit for drinking by adding, in a small proportion, some material possessing offensive odour and taste that cannot be easily removed. Such denatured spirit is known as methylated spirit and is sold without heavy excise duty. The denaturant does not interfere with the industrial use of the spirit. For certain uses, however, it is not feasible to mix a denaturant, as for example for spirit used in the production of tinctures and perfumes. For these purposes, rectified spirit has to be sold under bond, and special precautions are taken to avoid its misuse for drinking purposes.

Alcohol can also be used in place of petrol in an internal combustion engine. Like petrol, it is volatile. It can be carburetted and the mixture of alcohol vapour and air can be compressed and exploded in a car cylinder. Though it does not possess the high calorific value of petrol, it burns smoothly and requires less air for combustion so that, theoretically, alcohol can be as efficient as petrol especially in engines designed for alcohol. Even in the ordinary motor car engine, designed for petrol, alcohol can be used in place of petrol and gives

nearly the same performance. During the war, when the petrol supply had been cut down, alcohol was used in public transport vehicles in Travancore and elsewhere.

Pure alcohol mixes in all proportions with petrol while rectified spirit does not mix in all proportions. Formerly, pure alcohol, otherwise known as absolute alcohol, was a laboratory curio, but during the past 10 years, large scale methods of removing all water from distilled spirit have been developed and alcohol of 99.5 per cent strength can be manufactured almost as cheaply as rectified spirit. Such alcohol is particularly suited for use as a power producing fuel and is known as Power Alcohol. It may be used by itself or it may be mixed with petrol. It has shown that a mixture containing 1 part of alcohol with 4 parts of petrol gives a slightly better performance in an ordinary petrol engine than neat petrol.

During the war, the Transport Department in Travancore entered into a contract with the distillery at Nagercoil. All the surplus molasses were converted into rectified spirit and this spirit (containing 4 per cent water) was blended with 4 times its volume of petrol and the blend used as the fuel for a substantial part of the State Transport fleet. It may be observed that during the years 1940 to 1942, 148,826 gallons of rectified spirit were so used, and the overall mileage per gallon of the blend was 12.57 as compared with 13.6 which was the previous fleet-mileage on neat petrol. We could not produce water free alcohol during the war, as there was no plant in Travancore. In an experimental run of 6,000 miles, a Chevrolet engine gave 10 miles to the gallon on rectified spirit as against 13 miles with petrol. No alteration was made in the engine the starting, running and response to load were satisfactory and at the close of the experiment, the pistons and cylinders were clean and undamaged.

The Government of India Panel on the manufacture of sugar and power alcohol has recommended that the production of power alcohol should be encouraged in India and that wherever possible, alcohol should be compulsorily blended with petrol so as to reduce our foreign expenditure and our dependence on an imported article.

We may now see how far Travancore can produce alcohol and what economics and planning are necessary to reduce the consumption of petrol in the State.

Alcohol is obtained by the fermentation of starch or fermentable sugars. Starch can be obtained most cheaply from tapioca. In other countries, power alcohol has been obtained from the starch of potatoes. We cannot however, afford to think of diverting tapioca for the manufacture of alcohol as long as the food shortage lasts. There is, however, a cheaper source. When sugar solutions are concentrated in sugar refineries to produce cane sugar

crystals, a thick, brown, treacle-like, uncrystallisable liquid known as molasses, about one-third of the weight of sugar produced, is left behind. This will not give any crystals of edible sugar, yet it contains a good quantity of substances chemically akin to sugar, which undergo alcoholic formentation. The cashewnut "apple" or fruit has been suggested as a source of alcohol. It occurs only for two months in the year, it does not keep without change for long nor can it be dried and stored. The cost of collection is high. For these reasons, it has no value as a source of power alcohol.

The Indian production of sugar in 1950 is expected to be 16 lakhs of tons so that some 5 lakhs of molasses will be obtained. One ton of molasses gives 60 gallons of power alcohol, so the potential production capacity is about 30 million gallons of alcohol. In Travancore we have two refineries, one for palmyra sugar at Thuckalai and the other, under construction, near Tiruvalla. It is expected that to start with some 6,000 tons of molasses will be available from the latter, which would give 360,000 gallons of power alcohol.

The net annual consumption of petrol in Travancore before the war was about 1,200,000 gallons. To obtain this quantity of blended fuel, the State would require only 240,000 gallons of power alcohol leaving the balance of 120,000 gallons for use as potable spirit and as industrial alcohol. It is, therefore, of vital importance to the State that the production of power alcohol should be started in conjunction with the Tiruvalla Factory.

The output of molasses from the Tiruvalla factory is likely to increase and can cover the progressive increase in the demand for petrol In proper planning however, it is necessary that the consumption of a costly imported material like petrol should not go unchecked. There is already a great increase in the consumption of petrol and this tendency is likely to increase because money is cheap and easy. Yet the drain will be ruinous unless it is checked. Under the stress of war, producer gas was adopted, but with the return to peace conditions, there is a stampede back to petrol engines in the Transport systems because petrol engines are easier to work with. This has to be checked with a firm and stern hand.

There is one other aspect of liquid fuel position in Travancore which deserves attention. Not all the countries in the world produce petroleum. Great Britain does not produce much petroleum. Many others, like Germany, Sweeden, France and Italy also have no petroleum. Yet most of these modern countries possess their own refineries. They purchase crude petroleum from the oil fields and transport it to their harbour towns where they distil the petroleum and refine it. It is possible to crack or decompose it by heating some of the higher fractions to get more of the lighter fractions. Thus furnace oil if dropped

on a hot surface breaks up and gives gas, petrol and some kerosene. In a refinery it is possible not only to distil the crude material but also to transform one fraction to another which may be in greater demand and to establish an elasticity of production so that the output is adjusted to the demand.

There are several reasons why a refinery can be located with advantage in Travancore. We are on the sea-coast and we have extensive water-way connections reaching about two-third of the State. The petrol and other petroleum products consumed in Travancore and in the neighbouring areas have to pass through Travancore. The consumption of petroleum products in Travancore alone is sufficient to absorb the output of an economic refinery unit. The State can also accommodate a suitable unit for the production of power alcohol and the consumption of the State is such that the products of the refinery and the distillery can be blended and distributed economically.

There is another potential source of liquid fuels, namely, lignite. It was made clear in the first talk that the lignite available in Travancore is of such poor quality that it cannot be fired directly, as it does not burn continuously and it leaves behind a great deal of ash. It may however be possible to extract combustible fuels from this lignite either by direct distillation or by passing hot hydrogen or steam over heated lignite in the presence of promoters of chemical changes. In Scotland, for nearly a century, a shale rich in organic matter has been distilled to yield fuel oils Brown coals and lignite have been distilled in Germany, either alone or with hydrogen. For this purpose it is necessary to find out what quantity and quality of lignite is available and whether it can be mined profitably. If these prove promising, it will be necessary to investigate the economics of processing.

"A new star rises, the star of freedom in the East, a new hope comes into being, a vision long cherished materialises. May the star never set and that hope never be betrayed."

Pandit Jawaharlal Nehru.

Sayings from the Great

Kindness adds sweetness to everything. It is kindness which makes life's capabilities blosom. — Faber.

* * * * * * *

A single conversation across the table with a wise man is better then ten year's study of books. — Longfellow.

QUESTION BOX

(In this section answers are given by our soil and fertiliser Expert to questions received from the public on soil, agriculture and use of fertilisers.)

Question No. 1.

What is the proper dose of Ammonium Sulphate for the cotton crop ?

Answer:

Cotton is one of the most important industrial crops and the area under this crop in Madras Presidency is 24,36,370 acres. The most suitable soil for this crop is the deep black soil, generally known as the black cotton soil. This kind of soil is to be found mostly in the Ceded Districts, Coimbatore, Salem, Tinnevelly and Ramnad Districts. Under irrigated conditions cotton can be grown in all loamy garden soils.

For irrigated Cambodia cotton, Ammonium Sulphate can be applied at the rate of 2 to 3 cwts. per acre. The fertiliser can be applied before planting and ploughed into the soil or it can be top-dressed later, during the second month. In the case of the dry crop it is better to apply the fertiliser (2 cwts. per acre) to the previous cereal crop (Ragi or Cholam.) This will benefit both the cereal and cotton crop.

Question No. 2.

Can Ammonium Sulphate be applied alone to paddy ? Or should it be mixed with other fertilisers and manures ? If it is to be mixed, what is the proper ratio for mixing?

Answer:

Ammonium Sulphate can be applied alone to paddy and it will increase the crop-yield substantially. The acre-dose may vary from 100 to 150 lbs. supplying 20 to 30 lbs. of nitrogen per acre. Experience has shown that there is a better response when Ammonium Sulphate is mixed with other organic nitrogenous manures like oil-cakes, particularly groundnut cake, which contains about 7% nitrogen. Thus we will have a combination of both inorganic and organic forms of nitrogen. The proper ratio of organic and inorganic nitrogen is 3:2 That is to say, for a 100 lb. dose of Ammonium Sulphate (which will supply 20 lbs. of inorganic nitrogen) the quantity of groundnut cake to be mixed with it will be nearly 430 lbs. These two should be intimately mixed and broadcast over the field about 30 to 35 days after planting.

Question No. 3.

Can you prescribe a remedial measure for the well known Mahali disease of arecanut ?

Answer:

This is a serious disease of arecanut and it can do a lot of damage if proper measures are not taken at the right time. This disease is prevalent in the West Coast tracts and also in Nilgiris and South Canara

districts. The common symptoms of this disease are the rotting of the nuts, the appearance of greyish patches on the nuts, which drop down in large numbers The nuts appear shrivelled in size and we can clearly see the growth of the fungus on them. The particular fungus that causes this disease is known as Phytophthora Omnivora Var. Arecase.

To control this disease we can spray Bordeaux mixture on the trees. This mixture is prepared by mixing the solution of copper sulphate (5 lbs. in 25 gallons of water) and that of quicklime (5 lbs. in 25 gallons)

Quetion No. 4.

Why is superphosphate considered to be better than any other phosphatic fertilizer ?

Answer:

Superphosphate is generally manufactured by mixing either powdered bone or rock phosphate with sulphuric acid. These ingredients (bone and phosphate rock) contain phosphoric acid, which is one of the most essential plant foods, but the phosphoric acid is present in a totally non-available form. Under the action of sulphuric acid the phosphoric acid is transformed by chemical action into a soluble, available form, that can be readily taken up by the plant roots. Hence superphosphate is more effective in inducing crop growth for enhancing its yield than the other phosphatic fertilizers or manures which are much slow in action.

Question No. 5.

What is meant by the term 'green manuring' and what are the advantages in such a scheme of manuring ?

Answer:

It is a well known fact that green leaf is an ideal manure for the paddy crop. Under the marshy conditions in which this crop is cultivated the green leaves decompose easily and supply the crop with the necessary plant foods, that are released from it by the action of micro-organisms. But it is difficult to procure adequate amounts of green leaf for all the paddy lands. So under the scheme of green manuring crops belonging to the family of Leguminosae (such as Kolinji, Sunnhemp, Daincha, Indigo, etc) are grown on the paddy fields themselves and when fully grown they are cut down and ploughed under the soil. By adopting this method we can be sure that all the land will get enough green leaf. Moreover, these leguminous green manure crops will increase the nitrogen content of the soil by the action of the nitrogen-fixing bacteria contained in their root-nodules. These crops also bring forth the plant foods found in the deeper layers of the soil and thus benefit the following paddy crop in many ways. Field experiments have proved beyond doubt the efficacy of this scheme of manuring in increasing the paddy yield. This method of green manuring deserves to be taken up by more and more cultivators.

MANUFACTURE OF SODA ASH AND ALLIED ALKALIES

BY DR. D. N. DARUVALLA,
F. A. C. T. LTD.

CHEMICAL industry can be broadly divided into the manufacture of heavy chemicals and fine chemicals. Before any fine chemical industry can be established, it is absolutely essential for a country like India to have a flourishing and established heavy chemical industry. In this category, the manufacture of alkalies ranks supreme. It is one of the keys to modern civilisation. It is essential to the manufacture of fertilisers, glass, soap, paper, textiles and several other miscellaneous commodities.

The basic raw materials required for the manufacture of the commonest and most widely used alkali—soda ash—are salt, limestone, fuel, water and air. The consumption of materials for 100 Kilos of Soda ash are:—

Coke	6.5 Kilos
Limestone	120 „
Coal	50 „
Ammonia	0.22 „

To show the importance of soda ash manufacture the following statistics are presented:—

The world production of Soda Ash in 1941 was 7,000,000 tons and was distributed as follows:—

U. S. A. 9 Plants - normal capacity- 2000 tons per day

Great Britain 6 Plants - normal capacity- 1400 tons per day

Germany 6 Plants - normal capacity- 1000 tons per day

India 2 Plants - normal capacity- 120 tons per day

Distribution of Soda Ash in the year 1940:

Glass	904000 tons
Soap	182000 „
Caustic & Bicarbonate	780000 „
Paper	111000 „
Textiles	450000 „

From the above statistics it will be readily seen that in spite of the acute shortage of Soda Ash in India, no effort has yet been made to manufacture this commodity in quantities sufficient for India's needs. In 1936, the speaker was closely associated with the design of the first Soda Ash Plant to be built in India. Detailed description of this plant and a discussion of the processes involved and the operational difficulties met with will now be examined.

The Soda Ash Plant of Messrs. Tata Chemicals Limited is situated in Okhamandal on the coast of Kathiawar. This site was selected because of the abundance of limestone and solar evaporated salt. The salt is recovered from seawater by

means of salt evaporation in large settling ponds followed by evaporation ponds. A typical analysis of seawater shows that it contains the following salts:

Sodium Chloride
Magnesium Chloride
Calcium Sulphate
Calcium Carbonate
Magnesium Bromide

These salts are separated by the process of fractional crystallisation. For example when the brine reaches a specific gravity of 1.198, it deposits practically all of the Gypsum. At a specific gravity between 1.219 and 1.234, most of the sodium Chloride crystallises out. The Mother Liquor is then pumped to storage tanks for further processing.

For the sake of convenience the ammonia soda process will be divided into the following sections:—

a) Brine preparation,
b) Preparation of ammoniated brine,
c) Carbonation of ammoniated brine,
d) Centrifuging and calcining,
e) Burning of Limestone,
f) Distillation of ammonia.

A. Brine Preparation: The Brine is prepared by saturating sea water with sodium chloride in large concrete tanks. For the successful operation of the process it is extremely essential that the highest concentration of sodium chloride be carried in the Brine. The saturation of the brine with ammonia gas is carried out in absorber towers of special design. During ammoniation considerable amount of heat is liberated which is to be taken away by cooling; otherwise the ammonia will not be absorbed. Hence cooling tubes are embedded into the absorbing tower at different heights. The ammoniation of brine results in the precipitation of Calcium and Magnesium impurities. These are settled in large settling tanks and the supernatant brine is then pumped to carbonating towers where the main reaction of formation of Sodium Bicarbonate is carried out.

B. Details of absorption towers: These towers are made of cast iron sections and are 6′ 8″ I. D. by 52′ high and weigh 80.85 tons.

C. Carbonation of ammoniated brine: The fundamental reaction on which the process depends is as follows:–

$$NaCl + (NH_4)HCO_3 = NaHCO_3 + NH_4Cl$$

The solubility of Sodium Carbonate is extremely small in the presence of sodium chloride and ammonium chloride. Upon reaction of the ammoniated brine with CO_2 gas in the Carbonating towers, sodium bicarbonate precipitates out. The carbonating towers are of special design made up of cast iron sections with mushroom ring distributors and provided with cooling tubes at different heights. The carbonaters are 6′ 8″ I. D. by 83′ high and weigh 204.5 tons. These carbonaters have 30 cooler sections. Each cooler contains 88 cast iron tubes, 1.7″ I. D. × 8′ 10″ long and has a cooling

surface of 447 sq. feet. For proper operation it is absolutely essential that the heat of reaction be removed in the carbonating section, and the temperature of the carbonating liquor is not allowed to exceed 66°C.

D. Centrifuging and calcining: The sodium bicarbonate slurry is now pumped through continuous centrifuges and the mother liquor is returned to the ammonia still for ammonia recovery. The filter cake is continuously fed into gas fired rotary calciners where the sodium bicarbonate is changed to sodium carbonate and the liberated CO_2 gas is returned to the process.

E. Burning of Limestone: For ammonia distillation considerable amount of lime is needed and for carbonation CO_2 gas is needed. To supply these needs limestone mixed with coke in the ratio of 7 tons coke to 100 tons limestone is burnt in a vertical shaft Kiln 10′ inside dia. by 75′ high shaft. The lime is removed from the bottom by a revolving grate automatically and the gases which should contain 40% CO_2 are taken off the top and mixed with CO_2 from the calciners and sent to slow-moving horizontal double-acting compressors of a capacity of 2500 C.ft. a minute at N. T. P. These compressors are rated at 350 H. P. and move at 75 R. P. M.

F. Distillation of Ammonia: For the successful economic operation of the process it is absolutely essential that the ammonia lost be kept at a minimum. The mother liquor from the centrifuges is therefore sent to a specially designed ammonia still which is built up of C. I. ring sections and is in two parts—free ammonia still and the fixed ammonia still. In the free ammonia still, the ammonia is distilled over by steam and is sent for absorption to the absorption towers. The fixed ammonia is reacted with lime and the subsequent liberation of ammonia effected by steam. The calcium chloride slop from the bottom of the still is sent to waste.

Chemically the process looks extremely simple on paper, but it is extremely difficult to control in actual operation because of the following causes:—

1. Ammonia is a very volatile gas and it is highly difficult to keep ammonia loss to a minimum.
2. The Ammonia CO_2 mixture is extremely corrosive to iron apparatus. Free ammonia excludes the use of any copper in the process and brine at best is very difficult to handle in iron vessels.
3. The process demands non-stop working on a 365-day basis.
4. The different units are so interlocked that trouble at any point along the line shuts down the whole plant. These plant difficulties can only be realised by actual experience and no amount of lectures will convey vividly a realistic picture to the minds of those who have never operated a soda ash plant.

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*Summary of a lecture delivered by the author at the Engineering College, Trivandrum on 8th October 1947.

FACT NEWS

"Chemical Engineering" August 1947 issue contains a very interesting article about F. A. C. T. entitled "West meets East in unique engineering project" by J. V. Van Denburg, Jr., Bombay Bureau, McGraw Hill World News. The article is profusely illustrated showing all the important sections of the plant, aerial views, and schematic flow charts of the process.

The article has complete statistics as to the economies of a plant of this nature, and its contribution to India's food position.

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A DISTINGUISHED VISITOR

Sir Mirza M. Ismail, Ex Dewan of Mysore and Hyderabad States visited F. A. C. T. on 24th Sept. 1947. When approached by the Editor for his comments with reference to this factory, he made the following remarks:—

"It gave me great pleasure to visit your factory. It is quite a big factory, much bigger than the one in Mysore, and yet not big enough, considering the keen demand there is for chemical manures all over India. The Board of Directors are doubtless considering the desirability of extending the plant and increasing the output. The factory is built on an almost ideal site and possesses many natural advantages, of which full use is being made.

"This factory represents one of the many big things that Sir C. P. Ramaswamy Aiyar did for Travancore in the industrial field.

"I congratulate all associated with the factory on the efficient manner in which it is run."

CONTEMPLATED VISIT

On request from F. A. C. T., Press Representatives from the leading daily, weekly and monthly newspapers and magazines in Bombay and Madras Presidencies, Travancore State and other parts of South India are visiting the factory on 1st November 1947. It is also understood that the members of the Industrial Planning Committee will also be visiting the factory at about the same time.

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FACT TECHNICIANS DELIVER LECTURES IN TRIVANDRUM

The Technicians of F. A. C. T. delivered a series of lectures at the Engineering College, Trivandrum, as follows:—

Dr. D. N. Daruvalla - October 8th - Soda Ash and Alkaline Manufacture.
October 9th - Process control Instrumentation.

Mr. F. N. Chirico - October - 10th - Plant Engineering and Maintenance. October 11th - Manufacture of Calcium Carbide.

Mr. V. S. De Beausset - October 17th - Caustic Chlorine.

October 18th - Small plant design.

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FACT CO-OPERATIVE SOCIETY

We have pleasure to announce that the above Co-operative Society have been formed with the view of supplying employees of F. A. C. T. provisions, vegetables, cloth and other consumer goods at as low rates as possible.

The Board of Directors of the Company has sanctioned an advance of up to Rs. 15,000/- to meet the requirements of this Society. The Company is also giving facilities such as accommodation, furniture and the services of a full time secretary. Three out of seven directors will be nominated by the Management. Many employees have become members and sales is going on briskly.

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EMPLOYEES' ASSOCIATION

We have pleasure to record that the employees of the Fertilisers & Chemicals, Travancore Ltd have formed an Employees' Association for promoting the employee-employer relations and to give constructive suggestions thereto. We wish this organiastion all success and trust that this will turn to be a sound and strong body of disciplined men devoid of all narrow prejudices but having its only motto the upholding of the employee's rights, obligations and service to the nation at large through service to the industry.

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PROVIDENT FUND TO STAFF

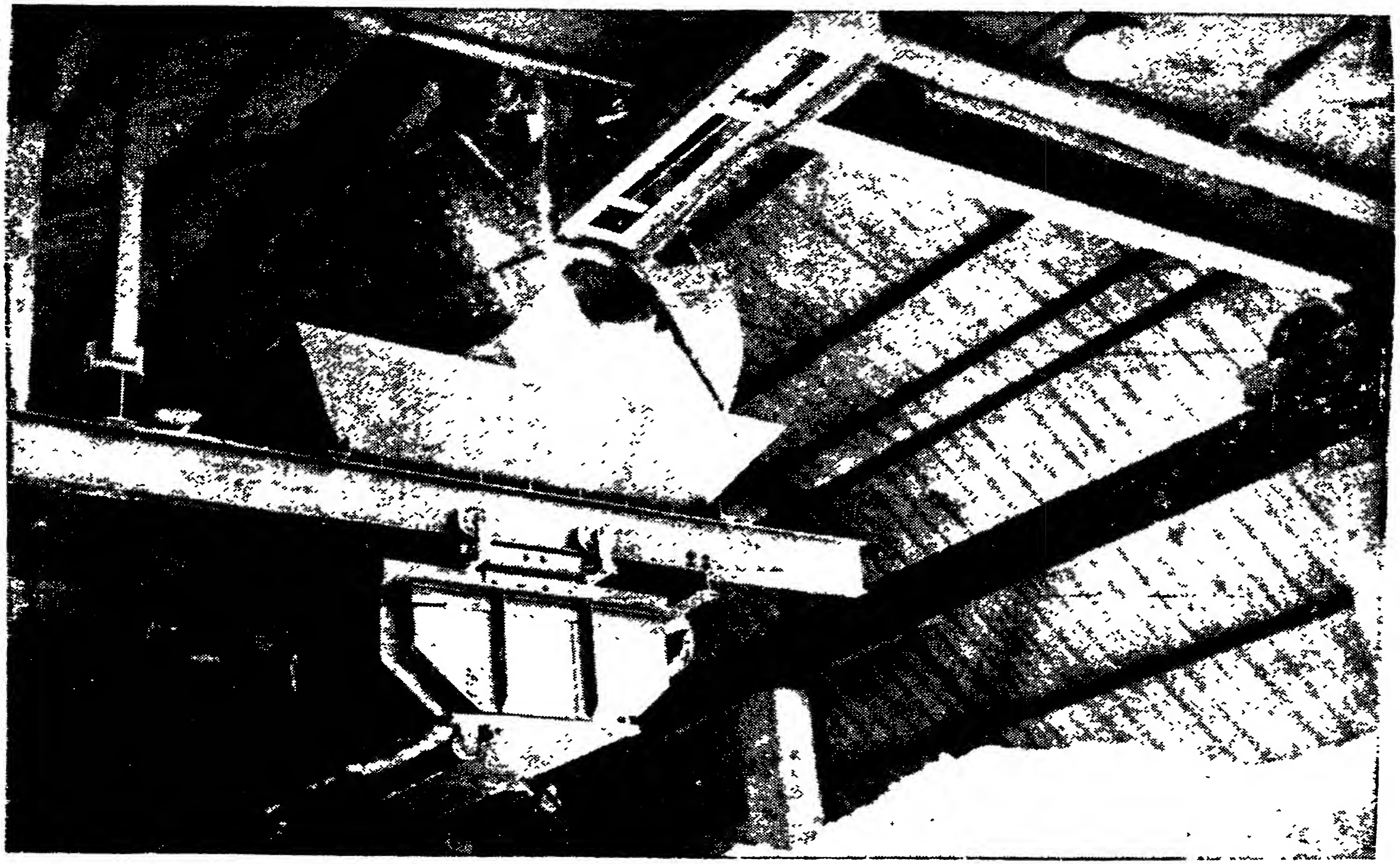
Effective 1st September the Board of Directors have been pleased to sanction a Provident Fund Scheme for the benefit of the permanent employees of the Company. Those who will be confirmed in future will also come under this scheme in due course.

Under this scheme the employee has to contribute 6½% of his salary and the Company will contribute an equal share. The essential features of the scheme are:—

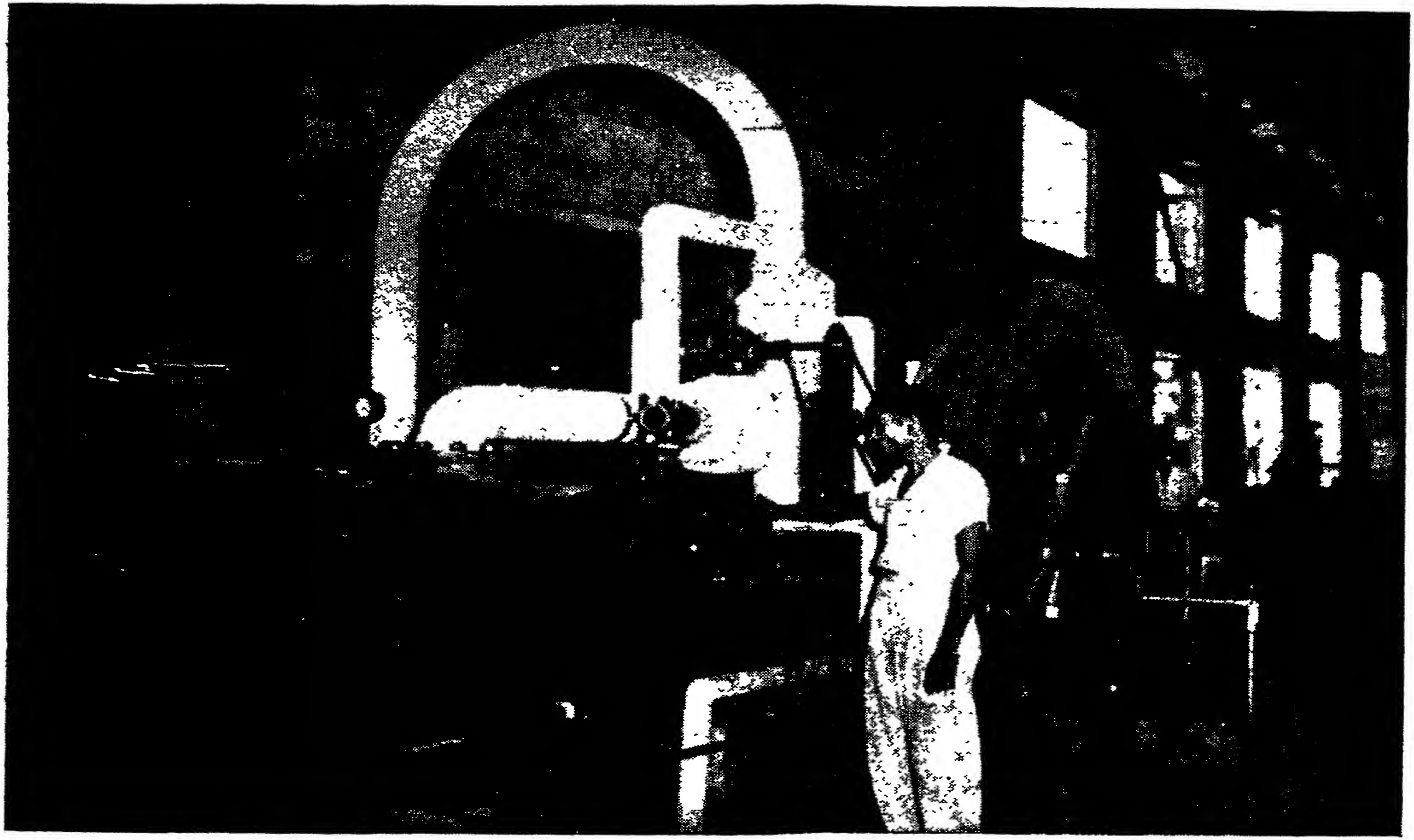
1. The employee's contribution will be paid to a pension policy at the beginning of each month and the amount is allowed to accumulate till the completion of 30 years of service or 55 years of age whichever shall occur earlier. At the end of this term he will be paid the whole of the amount plus compound interest at 3% per annum with an option to draw an annual pension so long as he lives with a minimum guarantee for 10 years in case he dies within such period. If the

Left to right are Mr. V. Seshasayee, Managing Director, Seshasayee Bros. Ltd., our Managing Agents and Mr. L. C. McCarty, Jr., Vice-President, The Intercontinent Corporation, discussing certain plans

A Group Photograph taken on the occasion of the visit of Sir Mirza M. Ismail. Fifth from left is Sir Mirza.



A view of the Sulphur Storage Building. On the top is a clam shell bucket transferring sulphur to a bin. This in turn will move on the monorail & transfer the sulphur into the hopper.



A view of the machinery house in the Ammonia Synthesis Section.

employee chooses to retire from the services of the Company before the full term of this policy he will be paid back the full amount he has contributed plus 2½% compound interest.

2. The employer's contribution of 6¼% of his basic salary will be paid as premia to a life insurance policy at the beginning of each month In case the employee chooses to retire from the services of the Company at any time during the currency of the policy he has the option either to continue the policy on the same terms as before or he may convert it into a paid up policy or he can surrender the policy and get a very liberal percentage as surrender value. On completion of the period of the policy he has the option either to draw a pension at the rate of 5% of the sum assured per annum so long as he lives plus the sum assured at death or he can withdraw the full amount of the policy plus 20% bonus The essential feature of the scheme is that there is provision for increase in the sum assured as salary increases.

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FAREWELL

We miss from our midst Mr. T. C. Gopinathan. Mr. Gopinathan was the editor of the FACT Magazine to start with and was subsequently in the Publicity Dept.

We wish Mr. Gopinathan every success in his new endeavours.

We are also going to miss Mr. S. Rangarajan who, with his personality and sense of humour, was very popular among all the sections of the staff. Mr. Rangarajan is leaving us to go back to the Aviation line and we wish him every success in his endeavour.

Dr. D. N. Daruvalla, an active member of our Editorial Board is leaving F. A. C. T. to go back to U. S. A. The readers would have no doubt enjoyed the illuminating articles of Dr. Daruvalla and we trust that in future also Dr. Daruvalla will favour us with good articles on industrial and scientific topics.

One Bad Turn

When a druggist went to pick up his long-awaited new car, he found the model completely equipped with fog lights, radio, spot-light, heater, seat covers and all the extras which dealers try to foist off on buyers these days. His objections were met with, "Take it or leave it. "The druggist took it reluctantly.

A few days later the automobile dealer came into the drugstore with a prescription. When he wrapped up the medicine, the druggist included aspirin, hot water, bottle vitamins, cough syrup, nose spray and other supplies for the medicine chest. The dealer's angry protests were brushed off with. "Take it or leave it ".

NEWS & NOTES..........in brief

INTERPROVINCIAL EXCISE BARRIERS & NEED OF CENTRAL CONTROL

The Indian Chemical Manufacturers Association has submitted a memorandum to the Constituent Assembly suggesting that excise on spirituous, medicinal and other preparations be made a Union subject and be taken off from the Provincial or concurrent list. A very important branch of the Pharmaceutical Industry is the spirituous industry engaged in the production of large varieties of medicinal preparations, like tinctures, extracts and several other spirituous products which form essential items in the Pharmacopoea and are used in alleviating the suffering of the people

It is felt by the Association that the greatest obstacle in the proper growth and development of the Pharmaceutical Industry is that under Government of India Act, 1935, excise on spirit contents of tinctures, extracts and other pharmaceutical preparations is a provincial subject. This has resulted in the formulation of divergent excise regulations and differing rates of excise duties in different Provinces and States without any regard to the needs and requirements for the development of this Industry as a whole. The differing regulations resulted in very great hardships for the Indian spirituous industry, as not only the excise duties were fixed by the different Provincial and State Governments arbitrarily, but the divergent regulations enforced by the Provinces and States imposed severe restrictions on the movement of indigenous pharmaceutical preparations from one place to another. The most significant feature of this system of provincial control of excise regulations has been that it has given indirect protection to the imported spirituous preparations in this country mainly due to the fact that imported spirituous preparations are not subject to the Provincial and State excise regulations and they are free to move in any part of the country once the duty is paid at the port of entry.

TECHNICAL AND SKILLED PERSONNEL IN INDUSTRIAL DEVELOPMENT

The United Nations Organisation has created an Economic Commission for Asia and the Far East with Headquarters in Shanghai to make an economic survey of Asiatic and Far Eastern countries and to explore the possibilities of greater economic and industrial development of these countries by offering them the necessary assistance under the aegis of the United Nations Organisation. The Secretariat of the Far Eastern Commission is undertaking collection of necessary data for the reconstruction requirements of these countries. Another institution, namely, International Trade Organi-

sation will also be shortly brought into existence, the details for which are at present being discussed at the International Trade and Employment Conference at Geneva. This Organisation is entrusted with the task of facilitating economic and industrial development of under-developed countries and to offer help to technical personnel of the under-developed countries in their plans of industrialisation.

To facilitate the above, the Federation of Indian Chambers of Commerce & Industry, in co-operation with the Indian Chemical Manufacturers Association & similar organisations, is collecting the necessary data which would be of great assistance in order to acquaint the International Trade Organisation of India's requirements of technical personnel.

KRISHNA & PENNAR RIVERS TO BE CONNECTED

It is gratifying to note from the recent radio talk of Mr. M. Bhaktavatsalam, Minister for Public Works, that the Government of Madras is now actively considering several important irrigation schemes.

Among other schemes the new item which is now under active consideration is the linking up of the Krishna and Pennar Rivers. It is stated that this would increase rice production by about 12½ lakhs tons. A dam would be constructed on the Krishna near Sangameshwar (where the Tungabhadra joins the Krishna and to bring the water so pouded to Pennar. A dam would be constructed across the Pennar near Someshwar in Nellore and the water would be taken further on. This project would bring 25,00,000 acres under cultivation and would be of immense benefit to the famine Districts like Kurnool and Cuddappah, as also the Districts of Nellore, Chittoor, Chingleput and South Arcot. The entire scheme, the Minister further revealed, would cost the Government about Rs. 60 crores.

HIRAKUD DAM APPROVED

The Orissa Assembly has unanimously decided in favour of the construction of the Hirakud dam of the Mahanadi Valley Multi-purpose Scheme after consideration of the report of Rai Bahadur Khosla of the Central Waterways Irrigation and Navigation Commission which had recommended to the Government of India that construction of the dam be taken in hand immediately.

THE TUNGABHADRA PROJECT

Certain technical matters connected with the construction of the dam in the Tungabhadra Project, on which differences of opinion have arisen between the Chief Engineers of the Madras and Hyderabad Governments, will he decided by arbitration by Sir M. Visvesvaraya.

The award that will be given by him, will be accepted by both the Governments.

It may be mentioned that one of the points at issue is in regard to the nature of the material that should be utilised in the construction of the dam. The Chief Engineer, Madras, has recommended the use of cement, while the Chief Engineer, Hyderabad, has suggested that the dam should be constructed of surki mortar (lime).

LOWER BHAVANI PROJECT

Sanction has been accorded by the Government to proceed with works connected with the Rs. 7 crores Irrigation Project on the Bhavani River in Coimbatore District.

The scheme, known as the Lower Bhavani Project, is an old one and was sanctioned as one of the post-war schemes. Provision to the extent of Rs. 28 lakhs has been made in the current budget in this connection.

The Project envisages construction of a dam and reservoir ten miles West of Satyamangalam on the Bhavani, a little below its confluence with the Moyar. The Government expect a return of 2½ to 3 per cent on the outlay. A betterment levy of Rs. 100 per acre is also contemplated in respect of lands in the area served by the project.

The work, when completed, will bring in approximately 2,07,000 additional acres under wet cultivation, half under food crops and half under commercial crops, chiefly cotton. The yield is estimated at 23,500 tons more of foodgrains, both paddy and millets, valued at Rs. 50 lakhs and commercial crops valued at Rs. 2 crores.

DAMODAR VALLEY PROJECTS

The West Bengal Government, it is understood will commence work on the Damodar Valley Project after the Puja Holidays. An administrator for the project will shortly be appointed by the Central Government in consultation with the West Bengal Government.

INDIA'S LARGEST HYDRO ELECTRIC STATION

The Jog Hydro-electric Works in Mysore State has successfully tried out its first generator of 12,000 kilowatts. Mysore's industrial progress has in a large measure been due to the early lead taken by that State in hydro-electric developments. With the installation of the Jog generating station, which is the largest attempt so far in India, the industrial advancement of the State will be considerably accelerated. Three more generators of 12,000 kw. capacity are expected to be switched on within a few months. By the end of the year 48,000 kw. of electricity will be generated from this big hydro-electric scheme. The Madras and Bombay Governments will also benefit to some extent by this scheme, as the Mysore State has agreed to reserve 5000 kw. to each of these two adjacent Provinces. The remaining 36,000 kw. will largely be used by the Mysore Iron & Steel Works at Bhadravathi. The entire Jog scheme is expected to be completed by 1950 when 120,000 kw. of electrical energy will be made available to the State and adjacent areas. This huge power scheme

will be utilized by the State authorities not only for industrial purposes but also to bring electricity for irrigation and domestic purposes to the remotest corners of the State. The per capital consumption of electricity in Mysore which is already the highest in India will be still further increased on completion of this gigantic hydro-electric scheme.

THERMAL STATION FOR NELLORE

The Government of Madras have decided to proceed with the scheme for constructing a Thermal Station for generating electric power at Nellore,

The scheme is expected to cost Rs. 89 lakhs and when completed will serve Nellore, Chittoor and Cuddapah Districts.

LEATHER RESEARCH INSTITUTE

The Institutes of Leather Research and Electro-Chemical Technology sponsored by the Government of India, it now seems fairly definite, are to be located in Madras.

The Government of Madras, it is learnt, will soon proceed to acquire a site of about 150 acres in Guindy for locating the Institutes.

RAZOR BLADE FACTORY FOR HYDERABAD

There is a prospect of the first razor blade factory in India being located in Hyderabad State with a capacity for a monthly output of ten million blades.

A leading American Industrialist, Mr. G. R. Mead, is negotiating with the Hyderabad Government for securing a suitable site for the location of the Factory, and seeking their co-operation to run the factory.

Mr. Mead said that the dry cool climate of Hyderabad State is eminently suitable for the production of razor blades, and besides skilled labour was easily available in the State. They would, however, have to import special high carbon tool steel suitable for razor blade production and they should also obtain the necessary equipment for processing and rolling. It may take one year to get the factory going, he added, and the most important matter is the training of the personnel.

MACHINE SHINES SHOES

A nickel-a-shoe, coin-operated shine machine has separate sets of motor-driven brushes for black and tan and a lever for making the selection. After it applies the polishing wax, brushes travel over the entire shoe. Then a high-polish wax is applied to the toe and a special high-speed buffer gives it a gleaming shine. This machine of Coin-Arts Industries shines a shoe in 30 sec.

NEW MANURE FACTORY TO BE STARTED NEAR TRICHY

A Phosphatic Manure Factory capable of producing about 9,000 tons of manure in the first year, is proposed to be brought into existence shortly near Trichinopoly, it is understood.

Phosphatic rocks found in or near Uttatur in Perambalur Taluk, Trichinopoly District, are to be used in the manufacture. About 8 million tons of raw material is estimated to be available in this area.

In the manufacture, it is stated Tennessee Valley process is to be adopted in all its details, eliminating the use of sulphuric acid, in order to reduce the production cost.

CERAMIC INDUSTRY IN HYDERABAD

H. E. H. The Nizam's Government has sanctioned a scheme designed to develop a ceramic industry in the State at a cost of Rs. 12 lakhs during the first five years. As a first step, a ceramic factory for the manufacture of crockery, insulators sanitiry ware, firebricks, firelay etc., and having a daily capacity of five tons of mixed crockery goods and insulators and 20 tons of firebrick and fireclay, will be established. The requisite materials are stated to be available in abundance in the State.

It is estimated that India imports ceramic goods valued at Rs. 30 crores per year and the prewar consumption in India of china-clay, whiting and betonite, was in the neighbourhood of 30,000 to 40,000 tons each. The gross income from the above factory is estimated to be about Rs. 10,20,000 while the working expenses are expected to be Rs. 6,75,000, leaving a net income of Rs. 3,47,000.

DEVELOPMENT OF FOREST RESOURCES IN HYDERABAD

A big program of converting about 20% of the total area of H. E. H. The Nizam's dominions into fruitful forest areas is said to be under the consideration of the Hyderabad Government.

It is proposed under this scheme to acquire large tracts of private lands suitable for being converted into forests besides taking over all Puramboke and waste lands for the purpose. The main items of work contemplated are the artificial regeneration of indigenous species of forest trees and the laying out of Village fuel plantations, and also irrigated fuel plantations. The entire scheme is estimated to cost about 22 crores of rupees spread over a period of 30 years. An important aspect of the plantation scheme is to have large tracts of 'bargu' plantations as this species of tree is very useful for the manufacture of matches. There are already a number of match factories in Hyderabad and this scheme may help to develop the match making industry on a much bigger scale. The Tungabhadra Project is also to be availed off in laying out irrigated fuel plantations. It is estimated that about 150 square miles of irrigated fuel plantations could be laid out under this project.

FACTS THAT INTEREST

MIXED FERTILISER

According to an article appearing in the *Chemical Engineering*, July 1947, the manufacture of mixed fertilisers takes place in two major stages in a modern fertiliser works.

First, superphosphate is made by reacting ground phosphate rock with hot moderate-strength sulphuric acid to convert the tricalcium phosphate to dicalcium phosphate and to eliminate much of the flouride. The resulting "green" superphosphate is cured by allowing it to remain for a period of days or weeks in piles. There, further reaction takes place, free acid is eliminated, moisture is evaporated, and insoluble components reduced. During this curing period the gypsum which has been formed sets up so that the whole pile is a hard mass.

After curing, the superphosphate is broken down with a light explosive, transferred by power shovel and small power truck to the mixing department where it is ground and mixed with the other components of the formula being made, that is the nitrogen carriers, potash chemicals and conditioners.

The combination is mixed, often with addition of ammoniating solutions, and transferred to the mixed goods storage. Slight further cure occurs there. But, if desired, the mixture can be shipped promptly either bagged or in bulk by railroad or highway trucks.

Mixing for storage or for bagging is accomplished with surprisingly simple handling through a succession of hoppers. Only in the case of first mixing with superphosphates does the fertilizer require special stirring or turning. The effectiveness of simple equipment is conclusively proved by frequent analyses of samples from single bags.

NEW METHODS FOR MINING MANGANESE

Many methods have been tried for commercially mining one of the world's largest undeveloped reserves of manganese, extending about 150 miles down both sides of the Missouri River. In South Dakota, where the ore occurs in concretionary nodules with a shale matrix, a pilot plant has shown that satisfactory results are obtained using a granulator and conical rolls, with power-shovel-mined material. The conical rolls (one smooth shell and one spiral-groove shell) are two truncated cones, the surfaces of which are parallel at the line of closest contact. The clay passes down between the rolls, and the nodules ride atop the groove between the rolls. Replacing the power-shovel with a scraper, it was possible to bypass the granulator and reach a capacity of 39 tons per hour. Apparently scraper mining is successful only in weathered portions of the ore-bearing area.

PENICILLIN IMPROVED

Crystalline sodium penicillin which requires no refrigeration to

preserve its potency, and is of a high purity that permits 200,000 unit dosage in the aerosol treatment of upper respiratory infections, has been developed by Commercial Solvents Corp. Other advantages are subcutaneous injection, and direct injection of large doses into the spinal canal in the treatment of the meninges, without evidence of nervous system irritation. Its potency is 1,400 to 1 500 units/mg. compared to 900 to 1,000 for the amorphous.

FURTHER DEVELOPMENTS IN WIRELESS TELEPHONE

Scientists and Industrialists concerned with wireless for years have been trying to perfect the wireless telephone to a point where it can work off a minimum of power. The aim was to produce portable sets that would work for both receiving and transmission purposes.

The latest development in this connection was tried out recently in London. A telephone system has been produced with which it is not only possible to receive messages in a moving vehicle, but also to reply.

This new wireless telephone can also be used between trains and signal boxes, and the time is not far off when all will have telephones fitted to their cars.

SUBSTITUTE FOR WOOD

A substitute for wood, which in some respects is better than real wood, has been produced by a Yorkshire firm.

This new substitute is made from compressed wood shavings, saw dust and resin glue. It is firmer and more resistant than real wood, with the result that screws and hinges hold better.

Furniture made from it is indistinguishable from high quality articles of the best possible wood.

ADVANCE IN NUCLEAR PHYSICS IN U. S.

Another advance in nuclear physics has been made in the United States with the splitting for the first time of atoms of lead, platinum, bismuth, tantalum and thallium.

Making this announcement at a meeting of the American Chemical Society, New York, Prof. G. T. Seaborg of the University of California, disclosed that to split platinum and tantalum 100 million electron-volts had to be used. Lead, bismuth and thallium were split with neutrons of 1,000 million electron-vlots and deuterons of 200 million electron volts.

These are produced by the giant cyclotron at the University of California. The Professor explained that the splitting of these five elements produced no chain reaction so they could not be used as a source of atomic energy.

JET ENGINES TO DRIVE TRAINS

Jet engines will soon be able to drive machines in Britain's factories, feed power stations, and whirl ex-

press trains from London to Scotland in a few hours.

This forecast was made hy Mr. Arthur Woodburn, Parliamentary Secretary of the Ministry of Supply after touring the national gas turbine establishment at Whetstone, Lincolnshire.

He said the use of gas turbine to generate power was already a practical proposition. An Aluminium train powered by gas turbines will go from London to Scotland stopping at most stations as quickly as the present non-stop train. The development of gas turbine was of greater immediate importance than the development of atomic power which was at least ten years away.

FILARIASIS - ELEPHANTIASIS

Filariasis is a worm-caused tropical disease, untreated stages of which develop into elephantiasis.

This dreadful disease attracted the attention of American Scientists in view of the trouble it caused to some of the American forces in the South Pacific. Drs. G. F. Otto and T. H. Maren of Johns Hopkins University have conducted research on this problem and report that phenyl arsenoxide is a cure. Filariasis has previously been treated with antimony compounds. These remove only the baby or embryonic worms, called microfilariae, from the blood. It is the grown-up worms that are believed to cause elephantiasis.

DRUG CURES MALARIA

Supplies of the drug paludrine, which cures malaria, are now available to the public throughout Australia, it has been announced by the Commonwealth Repatriation Commission.

Supplies of the drug up to now have been controlled by the Commission and the Defences and were available only to personnel suffering recurrent attacks of malaria.

It is believed that within six moths there should be no malaria in Australia. A six months course of two paludrine tablets weekly, which is recommended by the commission, is designed to cure sufferers from malaria relapses.

RAIN TO ORDER

A new method of making rain by spraying a preparation of Calcium Chloride, on suitable clouds is to be tried by the Australian Council for Scientific Research, it was announced recently.

Successful experiments have already been carried out in Australia with dry ice, but it is believed that the new preparation will be far more effective and will cause rain to fall over a wider range of cloud types.

MACHINE THAT CURES MANY AILMENTS

The U. S. Government will shortly test a German Machine whose inventors claim it could cure a variety of ailments-including asthma and migraine headaches-with ionized air.

Its heart is a tube of magnesium which when heated to incandescence *gives off electricity charged particles which are picked up by air stream shot past the tube.* The patient *inhales the ionized air through a* special mask.

A German professor named H. Lampert said the machine relieved high blood pressure, migraine, asthma, hay fever, sinus trouble, vasomotoric angina pectoris, vasomotoric disturbances during the climacterium, weather sensitiveness in persons suffering from muscular rheumatism, scar pains and climate allergy.

TELEVISION DEVELOPMENT IN U. S. A.

Production of Television receivers in the U. S. in 1947 will be about 400,000 according to a National Broadcasting official. Actual production figures for 1946 he said, showed only 10,000 Television receivers turned out.

OZONE CUTS METAL

In one recent experiment, aluminium 0.065 in. thick was cut at a reasonable rate by a 70-lb. air jet passed through an ozone generator and entraining heated water. The jet, 0.016 in. in dia., cut a 0.020-in. kerf. Apparently, ozone released by the jet corroded the metal surface, creating an oxide which was scaled off by the water. The water also pitted and eroded the surface-erosion and corrosion working together at cutting speed. Ozone released must be collected or dissipated before it harms the operator.

QUICK-SEASONED WOOD

Railroad crossties have been dried in U. S. A. from 80 to 30% moisture in 12 hr. with the new vapor method of Taylor-Colquitt Co. The wood is raised to high temperature in a closed chamber while protected against charring by an inert organic vapor, such as Xylene, which boils at 280° F., or high-flash naphtha, with a boiling point of 330° F. Means are provided for withdrawing the rapidly vaporized moisture and recovering the organic liquid. As the final step, the organic material is removed from the wood by a vacuum in the drying chamber.

URANIUM DEPOSITS IN GREENLAND

Dr. Donald Macmillan and his party during their exploration trip in the Arctic have found new ore deposits ot Uranium in Greenland.

NEW KIND OF JUTE

A Rangoon business-man is reported to be claiming the credit for having discovered a new kind of "jute". This "jute" is a species of plant, grown in abundance in all parts of Burma, from which he is stated to have obtained fibres for the manufacture of fabric. Experiments on the new kind of "jute," we understand, are being carried out by a group of scientists and if successful, might well bring into being a serious rival to Indian jute.

നിങ്ങളുടെ രക്ഷ

(സി. കെ. എസ്സ്. നായർ.)

"നിങ്ങളുടെ രക്ഷ മിക്കവാറും നിങ്ങളുടെ കയ്യിൽതന്നെ" എന്നതു് ഒരു പരമാർത്ഥം മാത്രമാണു്. രക്ഷയെക്കുറിച്ചു് എന്നും എപ്പോഴും നിങ്ങളെ അനുസ്മരിപ്പിക്കുന്നതു് ഒരു മഹാ ശല്യമായി പലരും കരുതുന്നുണ്ടെന്നു് അവരുടെ ചില പ്രകടനങ്ങളിൽനിന്നും വ്യക്തമാകുന്നു. കഴിഞ്ഞ ഒരു ദിവസം പടങ്ങൾനോക്കി കാര്യങ്ങൾ ഗ്രഹിച്ചുകൊണ്ടിരുന്ന ഒരു കൂട്ടം തൊഴിലാളികളുടെ ഇടയിൽ വിഷമസ്വരത്തിൽ ഒരാൾ പറകയാണു്, "ഞങ്ങളെന്താ പള്ളിക്കൂടംപിള്ളേരാണൊ ഇങ്ങനെ പടം വരച്ചു് പഠിപ്പിക്കാൻ". എത്ര ആലോചനക്കുറവും, ദുരഭിമാനവുമാണു്, ആ വ്യക്തിയെ മേൽപറഞ്ഞ പ്രസ്താവനക്കു് പ്രേരിപ്പിച്ചതെന്നു് ആലോചിച്ചുനോക്കുക. അത്തരം പ്രസ്താവനകൾ അനേകം പേരെ വഴി തെററിക്കയും അപകടങ്ങളിൽ കുടുക്കുകയും ചെയ്യുമെന്നു് ഓർമ്മിക്കണം.

തൊഴിലാളികളിൽ ആരും രക്ഷയെ സംബന്ധിച്ച അറിവുകൾ വിഗണിച്ചുകൂടാ-ഓരോ നിയമങ്ങളും നിസ്സാരങ്ങളാണെന്നു് ഒററ നോട്ടത്തിൽ തോന്നിയേക്കാം. എന്നാൽ അവ ഓരോന്നും അനുഭവങ്ങളിൽനിന്നും സൃഷ്ടിച്ചിട്ടുള്ളവയാണെന്നു് മനസ്സിലാക്കയും സൂക്ഷ്മമായി അവയെ പഠിക്കയും ചെയ്യണം. രക്ഷക്കായി, ഏതെല്ലാം പ്രവർത്തികൾ കമ്പനിയിൽനിന്നും ചെയ്യുന്നുവോ അവയെല്ലാം കൃതാർത്ഥതയോടെ സ്വീകരിക്കയും അച്ചടക്കത്തോടെ പരിപാലിക്കയും ചെയ്കയത്രെ, നിങ്ങളുടേയും സഹപ്രവർത്തകരുടേയും, രക്ഷക്കായി ചെയ്യേണ്ട പ്രധാന സംഗതി. വ്യക്തിപരമായ നിരൂപണങ്ങളും ദുരഭിമാനവും നിങ്ങളെ വഴിതെററിക്കുക മാത്രമെ ചെയ്കയുള്ളു.

അവിചാരിതമായി നിങ്ങളുടെ ചുററും അപകടങ്ങൾ ഉണ്ടായേക്കാം. അങ്ങിനെയുള്ള അവസരങ്ങളിൽ നമുക്കു് പല നിവാരണമാർഗ്ഗങ്ങളും അറിവുണ്ടായിരുന്നാലും പ്രവർത്തിക്കാനുള്ള കഴിവുണ്ടാകയില്ല. ഇങ്ങിനെയുള്ള സംഭ്രമത്തിനു ഹേതു രക്ഷാനിയമങ്ങളെ പഠിക്കുന്നതിനുള്ള ഉത്സാഹക്കുറവുമൂലം ഉണ്ടാകുന്നതാണു്. അതിനാൽ നിങ്ങൾക്കു് കൂർമ്മബുദ്ധിയും, സഹകരണമനോഭാവവും രക്ഷാനടപടികളെ സംബന്ധിച്ചിടത്തോളം ഒഴിച്ചുകൂടാവുന്നതല്ല.

നിത്യവും ജോലിയിൽ ഏപ്പെട്ടുന്ന നിങ്ങൾക്ക് തിരിച്ചുപോകുമ്പോൾ, അന്ന് യാതൊരു അനിഷ്ട സംഭവങ്ങളും ഉണ്ടായില്ല എന്ന കൃതാർത്ഥത ഉണ്ടായിരിക്കണം. ഓരോ ദിവസവും ഇങ്ങിനെ ശുഭപര്യവസായിയായിത്തീരുവാൻ ഓരോ വ്യക്തിയും ശ്രമിച്ചാൽ അതുതന്നെയാണ് നിങ്ങളുടേയും, നിങ്ങളെ സംബന്ധിച്ച എല്ലാവരുടേയും കമ്പനിയുടേയും സമാധാനത്തിനും അഭിവൃദ്ധിക്കും നിദാനം.

പൊതുവെ നമ്മുടെയിടയിൽ, വീഴ്ചകൾ, തീപൊള്ളൽ, ഘനമുള്ള വസ്തു അവയവങ്ങളിൽ വീഴുക, യന്ത്രങ്ങളിൽ കുടുങ്ങുക, വെള്ളത്തിൽ ആണ്ടുപോകുക, വിദ്യുച്ഛക്തി പ്രവാഹമേൽക്കുക, തീക്ഷ്ണമായ പ്രകാശത്തിൽ നോക്കിപോകുക—മുതലായ ആപത്തുകളാണുണ്ടാകുന്നതു്.

മോസസിൻെറ പത്തു കല്പനകൾപോലെ, രക്ഷയ്ക്കായി നിങ്ങൾ പത്തു വ്യവസ്ഥകൾ സ്വീകരിച്ചാൽ അപകടങ്ങളിൽനിന്നും മോചനം ലഭിക്കുന്നതാണ്.

1. അശ്രദ്ധ കുറക്കുക.

2. നിങ്ങളുടെ രക്ഷക്കായി വെച്ചിരിക്കുന്ന, ഉപകരണങ്ങൾ, പടങ്ങൾ, ലഘുലേഖനങ്ങൾ മുതലായവ അലക്ഷ്യമാക്കാതിരിക്കുക.

3. അധികാരപ്പെടുത്താതെ ഉപകരണങ്ങൾ കൈകാര്യം ചെയ്യരുതു്. ശരിയായി നിഷ്കർഷിക്കപ്പെടാതെ ഒരു ജോലിയും ചെയ്യേണ്ടതില്ല.

4. സ്വരക്ഷ മുൻനിറുത്തിയല്ലാതെ ഒരിക്കലും പ്രവർത്തിഎടുക്കരുതു്. രക്ഷാനിയമങ്ങളെക്കുറിച്ച് സംശയമുണ്ടെങ്കിൽ അതിനെക്കുറിച്ച് ചോദ്യം ചെയ്യുക.

5. അശ്രദ്ധയും ആലോചനക്കുറവും നിങ്ങൾക്കും കൂട്ടുകാർക്കും ആപത്തുണ്ടാക്കുമെന്ന് ഓർമ്മിക്കണം.

6. അപകടങ്ങളുണ്ടെന്നു തോന്നുന്നപക്ഷം സൂക്ഷ്മവിവരം സൂപ്രവൈസറെ അറിയിക്കുക.

7. ജോലി എടുക്കുമ്പോൾ പ്രായോഗിക നേരംപോക്കുകൾ ഉപേക്ഷിക്കയും മററുള്ളവരെ ഭയപ്പെടുത്താതിരിക്കയും ചെയ്യുക.

8. കൂട്ടുകാരുടെ രക്ഷയും നിങ്ങളുടേതുപോലെ കരുതണം.

9. വസ്ത്രധാരണരീതി പ്രത്യേകം നിഷ്കർഷിക്കുക.

10. അപകടങ്ങളുണ്ടാകുന്ന പക്ഷം പ്രഥമ രക്ഷാനടപടികൾ ഉടൻ കൈക്കൊള്ളുക.

വീട്ടിലെ കാരണവർ:— ദീർഘനിശ്വാസത്തിനുശേഷം അതിഥിയോട്—എന്തുചെയ്യാം, ചങ്ങാതി, ഇന്നലെ വരെ ഈ വീട്ടിലെ അധികാരി ഞാനായിരുന്നു.

അതിഥി:— ഇന്നിപ്പോൾ ജ്യേഷ്ഠനെന്തുപററി?

കാരണവർ:— ഇന്നലെ ഈ വീട്ടിലും ഉത്തരവാദിത്വഭരണം കൊടുത്തു. നാണി പ്രധാനമന്ത്രിയും,—അവളുടെ ഭർത്താവ് വാസു ധനകാര്യമന്ത്രിയുമാണ്.

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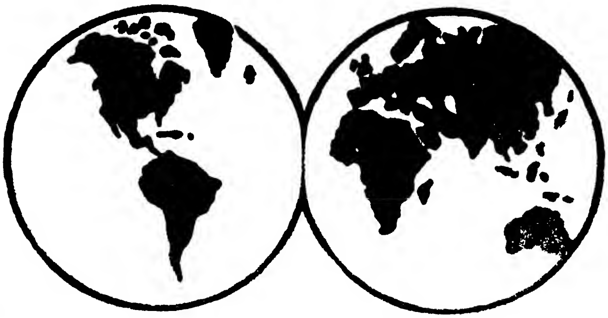


FACT

Vol. 2. Nov. Dec. 1947 No. 4.

In this Issue.............

ENGLISH

മലയാളം

Advertisements — Pages A to G.

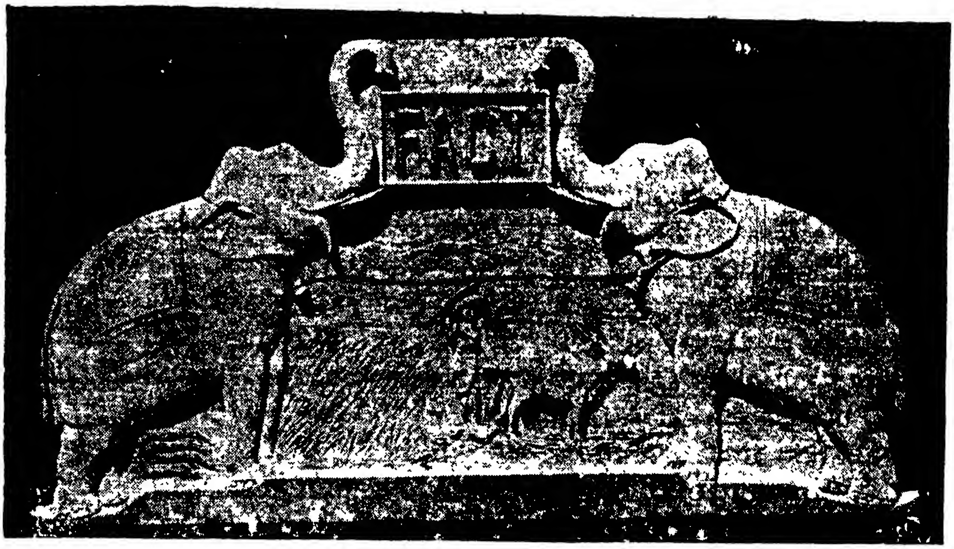
ON THE COVER PAGE:

What you see on the right is an L. C. T. with firewood, 150 tons of which can be transported in one trip. On the left is a crawler crane unloading and heaping up the firewood.

The firewood requirements of FACT are met by the Forest Industries, Travancore Ltd., from the forests at Malayattur. Reafforestation in the latest known scientific methods assures continuous supply of wood. The firewood is being shipped over the Periyar river by boats.

Note:—

We regret that, due to all the Presses in Travancore State being busy with printing of Electoral Rolls for the ensuing elections in Travancore, we had to issue a combined number for November & December, 1947.



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EDITORIAL

The recent announcement of The Hon'ble Dr. Shyama Prasad Mookherjee, Minister for Industries and Supplies, during his tour in South India have given the public much encouragement regarding the policy that would be adopted by the first Indian Cabinet as regards the industrialisation of our country

Addressing the employees of the Hindustan Aircraft Ltd., he said, "I want this to turn into one of the best factories that might be existing in any part of the civilised world". Dr Mookherjee has clearly stated that the Government is determined to develop Hindustan Aircraft Ltd., to its best capacity. The readers are already aware that the Hindustan Aircraft Factory has full capacity for manufacture of modern aircraft and the public feel that these facilities should be fully utilised. Dr. Mookherjee has assured that the Hindustan Aircraft facilities would be put into best use for manufacturing equipment for the defence of India. He has also hinted that appropriate organizational changes would be made in the Hindustan Aircraft Ltd., with the above object in view.

While addressing a meeting of the members of the Southern India Chamber of Commerce at Madras, Dr. Mookherjee disclosed that a special committee of the Indian Cabinet has been constituted to consider the question of ushering in a new policy of economic expansion. The biggest and immediate problem, he said, was to get the maximum production with the existing resources. The question of future expansion had also to be taken up simultaneously which, he suggested, could be done by first having the essential schemes put into operation in the next two years and then to draw up bigger schemes for development during the next five or six years. It was also essential, he added, to correlate the export policy of the country with future plans of industrial expansion so as to enable conservation of foreign exchange needed for the import of machinery from abroad.

Referring to the labour troubles in the country, Dr. Mookherjee added that a tripartite conference of Labour, Managements and Government was to be convened by the Government. With the advent of freedom both Industrialists and Labour felt that the change ought to lead to an improvement in their conditions Any blame for our troubles, he emphasized, had to be apportioned among all the contending parties alike

As regards nationalizsation of industries, Dr Mookherjee thought there was no difference of opinion as to the accepted policy that key industries must be nationalised He condemned the criticisms levelled against Government as to the alleged inefficiency in industries taken over by them and suggested that it was only proper in such cases for industrialists to lend their services to the Government. He cited the example of the Tata's Air Service where the Government had taken the majority of the shares and had yet left the management of the service with Messrs. Tatas It were idle, he continued, at this stage of India's history to dwell on mere slogans and emphasised that our first and foremost concern should be the most rapid utilisation of India's raw materials. The question of the limitation of the amounts of profits enjoyed by the industry was really

important during the present period as the wealth could not be allowed to accumulate in the hands of a few.

The various proposals contemplated above are highly commedable in themselves and deserve the active consideration of Industry and Labour alike, except for the question of "nationalisation" which still needs further clarification. However, it is encouraging to note from the budget speech of the Finance Minister that the Government has recognised the need and scope for private industry for many years to come and his assurance "not to hamper in any way the expansion of business enterprise" is highly encouraging. Although on the face of it the statements made by the Finance Minister and the Industries Minister seem to differ with respect to the policy of "Nationalisation of Industries", we take this to mean that the Government will adopt a very cautious attitude while putting their schemes of nationlisation into practice The general trends in recent years of economic opinion in India seems to favour a mixed economy in which there is scope for both private enterprise and state enterprise and the Finance Minister has expressed his general agreement to this pattern of our economy.

The Industries Minister as well as the Finance Minister have, during their several speeches invited the whole-hearted co-operation of trade and industry to help the Government to prevent the impending economic crisis by more production.

On behalf of The F. A. C. T. Ltd., we would like to assure the Government our full co-operation in increasing production to the maximum possible extent and we in turn look to Government to give us the necessary facilities such as increased allotment of petrol for transport etc., concession tariff rates for raw materials and finished products and refund of customs duty charged on the machinery and equipment imported for this plant in conformity with the policy of allowing ammonium sulphate or to be imported free of any duty.

Editorial Board.

Mr. V. Seshasayee's talk to Press Representatives

(Here is a verbatim report of the address made by Mr. V. Seshasayee to Press Representatives during the Press Conference held at FACT on 1st November 1947.)

Gentlemen:

IT has been a matter of profound gratification to me to have you, the august representatives of the Fourth Estate in our midst, to see for yourself at first hand, the outcome of our strenuous labours during the last few years. You, as Representatives of the Press, who have had occasion to inform yourself of what is happening in this remote part of Travancore, will also have occasion to utilise the great privilege of keeping the public correctly and comprehensively informed of the progress we have made. Gentlemen, the privilege of moulding and directing public opinion is a sacred and enviable one; I am aware that, in your own unobtrusive way, you are utilising this privilege to the best advantage of the country as a whole.

We are confronted at this critical stage in the history of this country, with the colossal problem of increasing our production of the basic necessities of life. You will all agree that food, which is the primary requisite of man, is in acute short supply and that every effort that is made to enhance food production within the country, while reducing gradually our dependence on external sources of supply, would itself be a great National Service. To a solution of this problem of increased food production, Governments all over the world, have afforded super priority over other industrial ventures. I have no doubt the importance of dealing similarly with this great problem in India, will not be lost sight of by the various Governments, Central, Provincial and State.

I learn that the Travancore Government are shortly convening a conference for concerting measures for increasing the food production in the State. This factory is ready to contribute its quota of service in solving this great problem of the hour.

The factory which you have just now inspected, is currently the largest chemical factory in India, producing fertilisers exclusively out of indigenous raw materials as pointed out by Babu Rajendra Prasad. The usual and well-known method of producing this particular fertiliser Sulphate of Ammonia involves the use of coke, of which India has but a limited supply. The copious supply of coking coal that would be required, if this factory were to employ this material, would make a serious draught on the already limited supply, apart from denuding an important source of mineral

Alcohol Distillary as soon as the new cane sugar factory commences production. The blending of power alcohol with petrol should be made obligatory by law so as to reduce the consumption of petrol. The use of petrol should be further cut down by insisting upon only producer buses to be employed in the plains. In the hills, where owing to the high power required, the producer gas transport may not prove efficient, we should prefer diesel transport, using cheaper diesel oil in preference to petrol, because the money value of the fuel imports is thereby reduced. In addition to all these measures, it is desirable that an oil refinery should be established in the State, so that instead of importing costly and refined petroleum products, we should import the crude mineral oil, refine it and process it according to our own requirements.

In respect of gaseous fuels it has been already indicated that producer gas buses should be encouraged. Moreover, an attempt should be made to introduce gas heating in small towns and community institutions such as hospitals hostels and jails, the gas being obtained from vegetable waste.

Even with all these steps we cannot be over optimistic about our fuel position. The expanding industrial and domestic demand will have to be met and this will impose a constant vigil. The consumption of fuels should be constantly reduced by the use of electrical energy, both as a source of heat and as a source of power.

With regard to atomic energy, the position of the State will clarify itself by and by. At the present moment there is intense competition by way of propaganda, research, espionage and bluff in rival but powerful world groups. We possess some of the raw materials required, but we lack the technical and, perhaps, the financial resources for making a success of atomic energy by our unaided enterprise. Whatever the future may decide, we should be determined on one point, namely, that we will not agree to be mere vendors of raw materials as in the past.

Above all, we have to plan the fuel development in the State. I would suggest that a statutory Fuel Board should be established with authority to control and guide the production and consumption of fuels in the State. Such a Board should be entrusted with the necessary planning. But no planning can succeed without a programme of austerity. In the past, people who had things to sell came to us, played upon our vanity and we thought we were progressing while all that happened was that we were buying new toys that others were anxious to sell for their personal profit. Here after, we have to measure our progress with our own standards and, if in the attainment of that progress, we have to deny ourselves, we should do it on a plan for the good of the country and as a necessary sacrifice in the service of our motherland.

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city with it and light cities? These are serious questions which the scientifically advanced countries are trying to answer. . There is, however so much romancing and at the same time so much "hush" on the subject that correct forecasts are not possible. One may safely conjecture that atomic energy will be made available for common use within a short time. Yet, the economy of the world cannot stand a sudden invasion by atomic engines which would shut down all coal mines, ruin all petroleum companies, render obsolete all the ships that swarm the seas, send the aeroplanes to refitter's shops and demand a universal overhauling of all primemovers, electric supply corporations, gas companies and metallurgical operations. Human imagination cannot visualise such an energy revolution, the capital systems of the world will not permit it and the profit making instinct of those that perfect such devices will caution them to release their invention on the graded squeaze principle. Let me explain further. Whenever a new device is invented, be it a razor or a fountain pen, a textile fabric or a toy, the production is deliberately limited and the price kept high so that only the rich can afford to pay for it. When it has been sold so that all in that purchasing grade have bought it, the production is stepped up, the price is reduced and people of middling means are reached. Even with atomic energy, the chances are that the introduction will be gradual and so regulated that the financial structure of the capitalistic world does not topple over and collapse.

Review

Now I shall briefly review the over all picture for the State given in the three articles. We have no coal or oil. Lignite, the only mineral fuel which we possess, is of poor quality and the available quantity is not known. Geological mapping followed by prospecting is necessary in order to determine the availability. When this is completed, an all out drive to find out processes by which it could be put to profitable use will have to be carried out. Fuel wood is our only large source of fuel supply, but for that to be maintained, planning is necessary. Private plantation of fuel woods should be encouraged; no area which can grow vegetation of any kind should be left fallow. The clearing of forests should be accompanied by a dual purpose re-afforestation, so that the younger trees could be used for fuel wood if necessary and older ones for timber. The production of charcoal in the interior of the forest should be positively encouraged. If need be, the wood may be given even for nothing. Though the revenues of the forest department will not gain, the fuel output of the State will increase, keeping the fuel prices down. The production of coconut shell charcoal and the development of a trade in this material are very desirable.

For liquid fuels the State should go all out to establish a Power

In certain industrial uses also, electrical heating is to be preferred to heating with coal or wood fuel. In the ceramic industry the porcelain-ware is charged into a kiln which has first to be raised to a high temperature and then cooled before the charge can be withdrawn. This is generally done twice for the same material. A great deal of heat is wasted and much time is spent in charging, cooling and discharging. A tunnel kiln, heated by electricity, gives better heating and a continuous output without any large wastage of heat. In this case electrical energy, because of its economic and continuous use, proves cheaper than wood or coal-firing which is attended by wasteful interruptions.

There is one other manner in which electrical power can indirectly aid fuel economy by replacing fuels in their use as power producers. The railways burn extensive quantities of coal and wood fuel in a manner which is as wasteful as that adopted in the domestic hearth and more criminal because it is tolerated by organised corporations or Governments. Electric locomotives are just as cheap, much cleaner and more efficient and electrification of railways in India should relieve the pressure on our coal supplies which are required for many uses for which electrical power is not suited. Again, road transport is largely run on imported petrol. Petrol traction is no doubt very convenient, it is adaptable and easy to run or maintain. But the cost of it to the country is astounding and much of that is incurred in foreign exchange which we can not fritter away without serious detriment to our national economy. Electrical trams and trollies have not found favour even in our large towns because they are not so convenient as buses. Yet, we have to introduce them compulsorily so as to reduce the import of petrol.

Before the war, one heard of motor cars run on batteries or accumulators. Such batteries are heavy and the cars using them had a range of fifty miles or so, after which distance the batteries had to be recharged. Such recharging takes time; it is not as easy as recharging a car with petrol from a pump. In the old days, road traffic was possible with relays of horses. It should be made possible with relays of batteries. The vehicle may drop its exhausted battery to be recharged and take up a fresh one. This may even sound ludicrous, but the alternative is to keep on paying dear money for imported petrol and, what is worse, make the country depend upon supplies which can be cut off in times of war, rendering the national nerve centre most vulnerable.

There has been much talk of atomic energy, but generally people are obscessed with the atom bomb and the power it gives to the country, which can produce it. In an atom bomb the devastation is wrought by the instantaneous release of collosal amount of heat energy. Is it possible to release this energy gradually for running machines, railways, motor cars or atomic-run ships? Can we release it so as to produce electri-

a hot surface. Cracking of the oil molecule takes place and we obtain a combustible gas and lighter oils. Gas is produced for use in laboratories by the "cracking" or "pyrolysis" of white kerosine or yellow oil. In oil refineries, cracking of heavy oils is done to produce more petrol, and gas is obtained as a by-product. This gas can be used as a fuel or it gives valuable oils if it is treated with chlorine. It is of significant importance for the utilisation of chlorine which is obtained as an inconvenient by-product from the caustic soda plant.

Miscellaneous Fuels

Electric power is also used for heating purpose. Thanks to the heavy rainfall, particularly in the highlands, many perennial streams flow in Travancore. The fall in altitude of the terrain in the State is rapid, giving many real or potential waterfalls. The water of a waterfall has been called "White Coal" because it gives electrical energy to drive industrial machinery like natural, black coal. This white coal is, however, far superior because its supply is current and continuous and it does not depend upon the accumulations of the ancient past. Coal mines get exhausted. Coal is not replaced in nature as quickly as is being consumed by man. White coal, or water falling from a height, gives hydro-electric energy continuously as long as the sun raises the clouds and the winds waft them to our hills to give us our monsoon rains.

Electrical heating is very convenient Like gas heating it can be turned on and off at will, it does not give smoke or waste gases nor is there any ash or clinker. Electricity can be transmitted more cheaply than gas and over longer distances of hundreds of miles. It does not leak away as badly as gas does. The temperature is also better controlled. With electrical energy we can get the slow warmth of the summer sunshine or the terrific heat of the electric furnace which is hotter than anything else known on this earth, barring atomic heat. Electrical heating is, however, more costly and it is not economical to employ electricity as a fuel except when there are some special advantages worth the extra expenses. It should particularly suit domestic purposes. In the kitchen we waste fuel without a thought of the morrow; in between the actual short periods of use the fuel burns on merely because it is difficult to light a wood fire. Unfortunately, the electrical heating device are all made abroad and imported, they are costly and not suited to our methods of cooking. Better and cheaper domestic rates for the consumption of electricity are also necessary; and there should be a better organised agency for keeping the electric heaters in good repair. With a switch to turn on and off, it would no longer be necessary to light a fire long in advance nor to keep it going even when it is not required merely because it would otherwise be difficult to start it when it is next needed. And electrical heating may not be more costly.

become familiar with the use of this gas in the running of pumps for the dewatering of paddy fields in Kuttanad and of some of the motor buses in the State during the petrol shortage. We have no coal, but we are well off for vegetable matter because in addition to trees which take at least 15 years to grow, there is a large annual crop of leaves, twigs, cocoanut shell and other organic materials. Usually wood is first made into charcoal and the charcoal is used in the gas producer, but much heat is generated in the making of charcoal and this is allowed to run waste. In the Fertilizer Plant at Alwaye in Travancore, where producer gas is manufactured not as fuel but as the source of nitrogen, air-dried wood is fed direct into the gas producer. Billets of wood are charged at the top and on their way to the hearth meet the ascending hot gases which dry them and partially carbonise them. This conserves heat energy in the process.

The heat-raising quality of producer gas is poor, but it is much cheaper than petrol or oil and is obtainable from materials which occur in the State.

2) **Water Gas** is formed if, in place air, steam is passed over red-hot coke or charcoal. The oxygen of water combines with the carbon and gives carbon monoxide. The hydrogen of water is obtained free in the product. Both are combustible and water gas is, therefore, a good fuel. There is, however, one snag. When water gas is formed, much heat is absorbed, so the glowing coke or charcoal gets cooled and the action slows down. To revive it, we have to blow air instead of steam over the bed of charcoal, which gives producer gas. When the bed is rekindled, we again supply steam. Thus water gas and producer gas are obtained alternately. The design of the plant is, therefore, complicated: specially trained staff is required to tend it and water gas cannot be produced in small portable units like producer gas.

3) **Coal Gas** is produced when coal is distilled destructively, or heated in closed retorts out of contact with air. We have no coal but if we heat wood, waste wood, leaves or husk in this manner, we get wood gas, acid liquors, creosote, tar and charcoal. At present only large scale plants are installed, but considering the wastefulness of our domestic hearths, it is possible to think of small family units in which fire wood, wood chips, saw dust, leaves and other dry vegetable refuse may be heated to give 1) gas which may be stored and used as required, 2) charcoal which could also be used as fuel and 3) tar and acid products which could be collected and refined.

The quality of our lignite is poor because of earthy impurities, but it may be possible to remove these by processes of floatation and the resulting fuel even if it cannot be used direct, may be of particular use as a source of gaseous fuels.

4) **Oil Cas** is obtained when heavy fractions of petroleum are poured on

FUELS IN TRAVANCORE-III

BY

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[Based on a Broadcast talk given at Trivandrum and reproduced with the kind permission of the Director of Broadcasting Travancore.]

THIS is the last paper of the series. In this I shall deal with gaseous fuels and other miscellaneous sources of energy that may replace fuels. I shall also give a summary of the fuel position in the State and indicate what has to be done to meet the expanding domestic and industrial requirements.

Gaseous Fuels

Gas fuels may be obtained as such from nature, or produced from solids and liquids by heating and by other processes. In some regions of the earth, especially in the petroleum bearing areas, due to the geology of the place, an inflammable gas gushes out of the earth which is collected, purified and burnt as fuel. This is called natural gas. Natural gas is also met with along with petroleum and comes out with mineral oil through the oil wells. The geological character of Travancore is such that it is very doubtful if we can strike oil or gas in the State.

A number of processed gaseous fuels are obtained in different places and used extensively. They are obtained from solid or liquid fuels; so they are generally more costly thou the original fuel. They are produced nevertheless, because of some special advantages in the use of gases. Gas can be conveyed by pipes from a central Gas House, it can be turned on or off at will and the fire can be started, raised and lowered as and when desired. The flame is clean, there is little or no smoke and there is no ash. Though in the production of the gas we use up fuel and incur other cost, the convenience and the economics of the use of gas and the possibility of distribution from a large scale central manufactory more than make up for this initial cost, and gaseous fuels are in extensive use. One draw back that should be mentioned is that gas cannot be transported over long distances and it is much more liable to loss by leakage than liquids.

The different types of gas fuels may be described briefly.

1) **Producer Gas** is formed when air is passed through a glowing bed of charcoal, coal, coke, lignite or any other organic material. Air contains one part of oxygen and four parts of nitrogen. While the oxygen of the air combines with carbon of the fuel to give carbon monoxide, which is combustible, nitrogen is of no use as a fuel. It is a dead weight and only lowers the heating value of the producer gas. In Travancore we have

compensate more than abundantly the loss of revenue that might have otherwise accrued from the preservation of the timber trees.

Having said this, it appears important for me to point out that out of this forest of 110 sq. miles, all except 5% would at a time be kept verdant and intact so that the forestry operations in which the Company will engage will not alter or affect the climatic or monsoon conditions prevailing in North Travancore.

A Sawmill has been erected to cut and process timber which will facilitate marketing of lesser known species. It is also proposed to make arrangements for seasoning timber and also make standard windows, doors and other timber material that will be required to meet the enormous demands of the industrial and private housing.

The advantages of using wood apart from constituting an indigenous source of supply, are that it frees the Company from dependence on any external source of supply of raw material which would create embararssment to such a large industry like this, should a state of international emergency rise.

May I state how very much we are beholden to the Travancore Government for helping us to bring this factory to this stage of production? It has been an arduous and difficult task setting up the several units and the help of an enlightened Government has been only too welcome. The rich natural resources of Travancore State could not be fully exploited to the advantage of its citizens unless they are exploited on the most modern lines with the help of all the advance that science has made elsewhere in the world. That Travancore should have afforded us such unstinted support at every stage in the progress of this vast undertaking, is a matter of profound satisfaction to all those connected with the Company. The citizens of Travancore and all persons associated with the scheme, directly or indirectly, have reason to be proud of the great task to which thay have successfully contributed.

I thank you, gentlemen, for your forbearance and for putting yourself to the inconvenience of coming over all to this distance in order to know what the Travancore State has to show in the way of a mammoth industrial enterprise.

wealth in the country. In addition to this, the difficulties of transporting coke over a long distance to this part of the country would itself constitute a major probem. It was for this reason that this particular factory has been so designed as to use firewood, which constitutes an important raw material in the production of Sulphate of Ammonia.

This factory which has been designed to produce over 50,000 tons of Sulphate of Ammonia annually, has to consume 300 tons of wood every day and you will agree that an unfailing supply of so large a quantity of fuel could hardly be ensured by depending on the usual private sources of supply. We have therefore sought to solve the problem of fuel supply satisfactorily by the establishment of a separate organisation, viz, the Forest Industries (Travancore) Ltd.

There appears to be a want of publicity about the activities of the Forest Industries Company which would seem to afford me abundant excuse for dwelling at some length on this subject. This Company has arranged to adopt where possible mechanised methods of lumbering and fuel gathering. The Government of Travancore have kindly leased 110 Sq Miles of forest in the extreme north of Travancore, out of a total of 2,400 odd sq. miles of forests in the State of Travancore, that is to say, this represents less than 5% of the total forest area in the State. Expert knowledge and experience have been harnessed in planning out forestry operation for the purpose of securing the requisite wood for the fertiliser company. It has been so arranged that cutting and lumbering should be done on the basis that re-afforestation will take place in the course of a 20-year cycle. Actual knowledge and expeience of North Travancore forest make out beyond the possibility of reasona ble doubt that regeneration of the forest for the purpose of firewood supply is complete within a 12 year period. It is at present proposed and estimated that we should be in a position to collect 40 tons of firewood per acre on the average under our present scheme of operations. This quantity of firewood is expected to be replenished within a 12-year period, though the Forestry Company's appraisal of regeneration allows for a longer span of years.

It is important in this connection to state that we do not claim that the timber wealth in these forests could be replaced within so short a time cycle. The growth of timber takes a very much larger number of years. The timber removed from these forests is treated as a lost asset in respect of which compensatory arrangements must be made. We gather from the Government of Travancore that a major portion of the revenue that they would get on the sale of this timber is proposed to be separately funded and capitalised. This fund will be allowed to accumulate and the return on the investment of the asset so built up is expected to

The Problem of the Burma Bean

BY

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DURING the past six months, there has been a great deal of public agitation about the harmful and even deadly - effects of a variety of bean which has been imported from Burma. Over eighty cases of poisoning and at least six deaths in the Madras Province have been attributed to the consumption of this bean. The Government have taken propmt action by freezing the entire stock with the wholesalers in the Province. They have also made it an offence under the Health Act for any one to sell the bean. The bean will not be released to the public unless the Government are satisfied that it can be rendered absolutely safe to the consumers.

The earlier history of the Burma Bean.

The Burma bean (Phaseolus lunatus Linn) is not a stranger to South India. It used to be imported in fairly large quantities and because it was also cheap, it was popular, especially among poorer sections of population, under the name Rangoon *Mochai*. It was used chiefly for preparing "Sundal" a dish which is familiar on festive occasions and for cooking along with different vegetable dishes. Till recently, no case of poisoning or death through the use of the bean has been reported. The reason for this lies probably in the fact that, in normal times, the bean would be consumed only in small quantities and that generally along with other foodstuffs. It was only recently that the poorer section of people used the bean as the sole article of food. Even then, the available evidence would show that the cases of poisoning are traceable to the use of only certain subvarieties and that in the under-cooked condition. In the Bombay Province where the bean is still being used, no case of poisoning has been reported.

The nature and extent of the poisonous ingredient in the bean.

The occurrence of hydrocyanic acid in association with a glucoside in the Burma bean has long been known. In addition to the glucoside, the bean also contains a ferment which breaks up the former and releases the hydrocyanic acid. It is the free hydrocyanic acid that is responsible for the poisoning.

Hydrocyanic acid (Prussic acid) is a deadly poison when taken in more than minute quantities. 50-80 milligrams has been described in literature as a fatal dose. On the other hand, smaller quantities of the acid serve as digestive stimulants and are actually prescribed by doctors for correcting gastrict disorders. 2.4 to 6 mgm. is the usual prescribed dose

and assuming that 4 doses are taken in a day, about 25 mgm. a day spread over 24 hours can be tolerated and even prove to be beneficial. We can now proceed to consider whether the hydrocyanic acid present in the bean comes within the tonic or toxic range.

The Burma bean as familiar in South India is classified into four sub-groups: (i) the single white variety consisting of small white beans; (ii) the double white, being of the same shape and colour as the single white but practically double the size of the former (this variety is also known as Butter beans); (iii) the chocolate brown type which is also known as the Sultani variety; and (iv) the speckled variety which has a light shade between orange and red and which has characteristic striations on it. Of the four varieties, the double white and the chocolate brown do not contain more than about 150 parts per million as combined hydrocyanic acid. The other two varieties normally go upto 300 parts per million. Occasional specimens of the latter may contain even as much as 500 or 600 parts per million In the raw stage, all the four varieties may be said to contain more than the permissible amount of hydrocyanic acid. As the beans are not however consumed in the raw condition, it would be of interest to know how the hydrocyanic acid content is affected by the usual operations employed for cooking.

Effect of different treatments on the hydrocyanic acid content of the bean.

It has already been mentioned that the enzyme present in the bean acts on the glucoside releasing hydrocyanic acid. This takes place in presence of moisture, so that when the bean is soaked in water, the reaction takes place. The hydrocyanic acid has a low boiling point, so that, on strong heating, it is removed at a fairly rapid rate from solution.

On cooking the whole bean to a soft centre, it is found that every variety of the bean shows a substantial drop in hydrocyanic acid It ranges from about 40 to 50 parts in the double white and Sultani varieties to 150-200 parts in the single white and the speckled varieties. The latter are rather difficult to handle because of the presence of large numbers of hard and immature beans which are very slow to cook. The hydrocyanic acid, being water soluble, would be largely in the liquid in which the bean is cooked. If the cookig is incomplete, the bean will also contain a fair amount of hydrocyanic acid. Dry roasting of the bean results largely in the destruction of the enzyme, but the glucoside is only partly destroyed. There is evidence to show that, in the case of animals, the glucoside unaccompanied by the enzyme is harmless. Further evidence is needed to show whether the same treatment would render the bean safe for human consumption.

Soaking of the bean in water leads to the steady penetration of the water followed by inter-action between the enzyme and the glucoside. The reaction is slow, especially in the case of the speckled variety and it would require prolonged soaking for 3-4 days to remove most of the hydrocyanic acid. If the beans are then dried, the hydrocyanic acid content is reduced to a harmless level. Based on this observation, methods have been suggested by different workers for making the bean quite harmless. Soaking the bean in water for 24 hours or more, has been advocated by a number of investigators. One has* recommended the use of a solution of sulphur dioxide as steep water. Another investigator has recommended the use of dilute ammonia.

After prolonged soaking, the the bean gets some what dark and disfigured. If sufficient care is not taken, it is also likely to become smelly. This will make it unattractive to the buyers.

Our recent studies have shown that although the reaction proceed yvre slowly in the whole bean, it proceeds much faster when it is split or coarsely ground. Thus, even overnight standing of the flour moistened to 50% with water followed by drying in the open yields a raw product containing less than 30 to 40 parts per million of hydrocyanic acid. The dried flour, on being used for cooking, loses further quantity and the cooked preparation contains less than 20 parts per million of hydrocyanic acid. At this level the products are absolutely safe.

Although the moistening of the flour is very efficacious in bringing about the desired results, it does nevertheless offer some practical difficulties. The mixing of the flour with water and the drying of the resulting paste is not easy to conduct on a large scale. The cost of processing will be fairly high. It would be easier to work with the split bean. Drying in that case will also be easy and rapid.

As moistening and cooking are normal operations, it was considered to be of interest to see whether the conversion of the raw untreated bean into a flour would itself be sufficient to bring about a substantial drop in the hydrocyanic acid of the cooked preparations. This was considered to be of practical interest because the bean is not normally consumed as flour in the Madras Province.

Hydrocyanic acid contents of food preparations prepared out the flour.

Experiments were therefore conducted with the flour prepared out of the four varieties using it for the preparation of the different food materials. The following results which were obtaind with the double white variety which contained initially 160 parts per million (p. p. m.) of hydrocyanic acid would be of interest:—

Iddali, 3·18 p. p. m; Dosah, Nil; Bajya, Nil; Bagoda, Nil; Bonda, Nil; Upmav. 21·6. p p. m; Kesaribath, 11·8 p. p. m; Mysorepakh, 11·1. p. p. m; Halva, 7·3 p. p. m; Muruk, 6·8. p. p. m; Ompody, 7·8 p. p. m; Chappati, 2·4. p. p. m; Puri, 2·4. p. p. m; Kuzh (thick gruel). 5·1 p. p. m. To reach the toxic level one will have to eat about 400 Iddalis, infinite number of Dosais, Baiyas, Bondas and Bagodas, over 5 lbs. of Upmav, 9½ lbs. of Kesaribath, 225 slices of Mysorepakh,

15 lbs. of Halva, over 16 lbs. of Muruk, 14½ lbs. of Ompody, 525 Chappatis, 1751 Puris and 21½ lbs. of Kuzh-*at a single sitting.*

It would be seen from the above that the oilfried preparations contain no hydrocyanic acid at all. The other preparations also contain only minute quantities, so much so that enormous quantities - much beyond the capacity of the human stomach - will have to be consumed to reach the toxic level. Similar results have also been obtained with other varieties and they also show that when the bean is made into flour and then cooked there is practically no risk of being poisoned by such preparations.

Consumer trials carried out with the different food preparations would show that the bean flour is an excellent substitute for the Bengal gram in many cases. It can also serve as a substitute for the Black gram or wheat, as the case may be for certain other preparations.

Occurrence and distribution of hydrocyanic acid in the plant kingdom.

Hydrocyanic acid is widely spreade in the plant kingdom. Several seeds, tubers, leaves and fodder crops contain varying amounts of hydrocyanic acid. Among the commoner food materials, the almond (especially the bitter variety) the linseed, the jowar and certain varieties of tapioca are wellknown instances. Usually the cyanogenetic glucosides are somewhat bitter, so much so that one does not normally eat such a large quantity as to get poisoned. Moreover, the cooking operations help us to remove a substantial part of the hydrocyanic acid.

If the hydrocyanic acid content could be reduced to about the tonic level (about 6 milligrams at a sitting), the bean could not only be safe but also make a good addition to our limited supply of pulses. Because of its cheapness, it would be largely a poor man's food, so, any treatment proposed should be simple and inexpensive. Small amounts of hydrocyanic acid are actually helpful to digestion, so that there is no need to remove the last traces. As long as care is taken to see that the maximum quantity of the processed bean that can be consumed at a sitting will not contain much more than the tonic dose prescribed by doctors the consumer is quite safe. The toxic dose is more than eight times the tonic dose, so, there will not be any risk of reaching upto that level. Excepting in very rare cases, the bean is not likely to be consumed as the sole article of food. Ordinarily it will form only a very small part of the diet.

The immediate problem before the country is the utilisation of large stocks of beans which have been recently frozen by the orders of the government. At a time when the country is short of food-espcially of pulses it will be a very sad thing if the beans are to be discarded without any attempt at treatment. In addition to this there is the long-range problem of the importation of further quantities of the bean and the pretreatment that would be needed to render it absolutely safe for the consumers. These subjects are now under the careful considerationof the Government and it is hoped that a solution, which will be in the best interests of the consuming public, will soon be reached.

THE TREASURES OF TRAVANCORE FORESTS

BY A. GOPALAKRISHNAN, B. A.,
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TRAVANCORE is one of the most progressive and premier States of India. With picturesque mountains clothed with magnificient forests, valleys glittering green with sunny showers, broad plains with dense plantations of budding cocoanut palms, green meadows echoing with the bleat of flock and with navigable backwaters and rivers babbling over their stony beds,- Travancore has been blessed with the choicest gifts of Nature in natural resources. Rich in forest produce and foodgrains, rich in rubber, spices and garden products, rich in mineral wealth, - the State can be said to be self-sufficient so far as its potential industrialisation can be envisaged.

The forest resources of the State are the pride of Travancore. Thanks to the judicious policy of reservations adopted by the Government, there are about 2500 sq. miles of reserve forests here today. More than 600 species of timber are found in these forests, the chief of which are Teak, Ebony, Blackwood, Anjili, Vengai, Maruthy and Thampakam. Besides being the treasure house of such highly useful virgin timber, these forests abound in fuel wood, softwood, cardamoms, honey, wax, bamboos, reeds, rattans etc. There are other articles of minor produce, such as oil seeds, medicinal herbs, gums, resins, tannins, chemicals, ornamental plants, wild fruits and nuts, mosses, barks etc. useful in commerce, medicinal arts and chemistry. There are thus three distinct classes of forest produce construction materials (sawn logs, poles, posts, cross ties etc,) softwood materials (containers, boxes etc.) and chemical poducts (chemical pulps, plastics, tannins, dyes etc.)

Wood varies widely in its composition and structure. All species of commercial importance are carefully studied and analysed as to their physical, chemical and mechanical properties in their relation to prospective uses. Thus our teak, being strong, stiff, hard and durable, is profusely used for building construction, ship-building, bridges, posts, cross-ties etc. and is in great demand in the world market. Thampakam and Venga are the best for barges and boats. Blackwood and Sandalwood possess attractive figure, colour and grain and are regarded as premier woods for furniture, interior finish, cabinet work and the like. The Travancore Government leaves no stone unturned in promoting the regeneration of the forests, natural as well as artificial and introducing new methods of industrial and engineering fabrication of timber. Many construction materials are chemically treated to prolong their length of life in service. Ascue plants have been erected by the Government for

treating timber for the Electric Department and for the public.

Plenty of softwoods are available in our forests which can be utilised for the manufacture of tea boxes, containers, barrels, etc. Cheap woods which are easily worked, soft textured and of uniform grain, which do not contain oils or discolouring substances are necessary for this and our forests warm the hearts of industrialists for such enterprises. Enormous numbers of containers and boxes are required in Travancore itself for the packing and shipment of tea, garden products, canned goods, fruits, fish etc. The wooden box has been demonstrated as a superior form of container for the safe shipment and protection for our exports and this phase of forest utilisation has to be encouraged and increased. In pre-war years, we were importing a predominant portion of our requirements of tea boxes, from Europe and the U. K. The war completely stopped these imports and hence plywood industries received a stimulus in our country.

Next to lumber, fuelwood is the most important product of our forests. In addition to its vital part in the domestic economy of our country fuelwood is widely used as a source of power and for chemical utilisation. In the Fertilisers & Chemicals, Travancore Ltd., fuelwood is used for the production of ammonia and the producer gas plant there converts 250 to 300 tons of firewood per day into producer gas leaving useful by-products as tar, resins oils etc. The large quantity of wood required by the producer gas plants is supplied by the Forest Industries (Travancore) Limited, the first enterprise of its kind for the intensive, efficient and scientific utilisation of the forest resources of Travancore.

The field of the chemical utilisation of forest resources has grown in importance among forest industries. There are promising opportunities for further development of knowledge which may be supplied for profitable utilisation of wood, particularly of wood waste. Forest research in our country is unfortunately still at its infancy and unless remarkable progress is made in this line, full scale chemical and mechanical utilisation of our products is almost impossible. We are an exceedingly wasteful country in the handling of natural resources. Even now more wood and forest produce are heaped and wasted in our forests than are finally utilised. Forest products, Laboratories and Schools of Forestry are the crying needs of the day. These are the keynotes of successful forestry practice. Through scientific research and trial of improved commercial practices, in the woods and at the mills, better and less expensive products should be manufactured without any wastage. Substantial progress has already been made in Travancore in these respects; still that which yet remains to be done is so great that what has already been achieved is apt to be ignored.

Pulp and its diversified products are among the most important

industries in the field of Chemicals. Wood consists of a skeleton of cellulose and in addition varying amounts of lignin, tannin, resin, gum and other materials. In the processes of chemical or mechanical reduction, many of these materials can be developed into useful products. The manufacture of pulp and its principal products, paper, is one of the most important of American industries. There are about 1270 pulp mills in the United States. Approximately 90% of all paper manufactured in America is made wholly or in part from wood pulp. The wood pulp industry yields numerous varieties of paper products, such as newsprint, bond, tissue, wrapping wall paper, parchment etc. Travancore forests offer plenty of scope for this industry. We have got only one paper mill (Punalur) and lakhs of rupees worth of paper products are being imported from outside. With patient painstaking research works, coupled with the utmost frugality of consumption of every scrap of useful raw material, we can not only be self-sufficient in paper products, but can very well be a paper exporting country in the nearest future.

Out of waste woods, toys can be manufactured on a large scale. In the piping days of peace, India used to import toys alone of the value of 28 to 30 lakhs per year, the bulk of which came from Japan. With Japan being what it is now, and with so much of purchasing power in the country, a well-organised and efficiently run toy factory in Travancore has a very bright future before it. The Travancore Wood and Toy Industries is a small beginning for the exploitation of these resources.

We have in our forests, materials excelling the Bengal Jute and Philippine hemp. The reeds and bamboos of Travancore forests have more tender, strong and durable fibre which can be utilised for large scale manufacture of bags and baskets.

Travancore forests present abundant resources in reeds, which form the best raw material for the manufacture of rayon or artificial silk. The Travancore Rayons Ltd. has been started for the profitable utilisation of these resources hitherto wasted.

The manufacture of rayon is an intricate and complicated operation.

Plastics represent a relatively new development in the utilisation of forest products. Wood plastics, are made largely from sawdust. In the conversion of raw materials, enormous volume of saw dust and shavings are produced. These possess high potential values and can be profitably utilised in the manufacture of plastics and explosives. In Travancore we have scarcely begun this work of salvaging wastage.

Again there is a wide variety of wood, bark and leaf extracts that assume considerable importance as products of the forest but which are wasted now. These are principally

tanning materials. Our Forests have not been developed so far as their tanning resources are concerned. These sources, little developed at the present time, may be depended upon for sufficient utilisation in the future. We can get plenty of dye materials also from our forests. Many of our important industries are dependent upon these dye-stuffs but the use of the forest-grown materials has not developed much.

Thus diverse methods can be pursued in converting these products from the raw materials of standing timber to useful commodities. Knowledge of the principles and practices in the harvesting and utilisation of these products has been greatly advanced and consequently much more intensive, efficient and systematic utilisation of the raw materials have marked our progress in recent years Much research and study have been devoted to the new and useful commodities. The results of these have blazed the trail to better forestry operations and improved and more economical methods of harvesting, conversion and distribution.

The Forest Industries (Travancore) Ltd., is a practical demonstration of this enlightenment. It is a pioneer effort at the integrated utilisation of the various raw materials provided by the Forests with the practical application of modern scientific knowledge of the properties manufacture, conditioning and marketing of these. It took shape out of lofty ideals and high aspirations and represents a solid and substantial achievement in the industrial history of Travancore. Its activities are many and manifold, economical and efficient harvesting of timber crops and their conversion into a wide variety of useful commodities constitute one among the important objects of this enterprise.

In the establishment, growth and development of Indusries, Travancore has always been in the vanguard. Several subsidiary Industries allied to the utilisation of forest resources are already under consideration of the Government and ere long Travancore will find an outstanding place in the industrial map of India.

Sayings from the great.

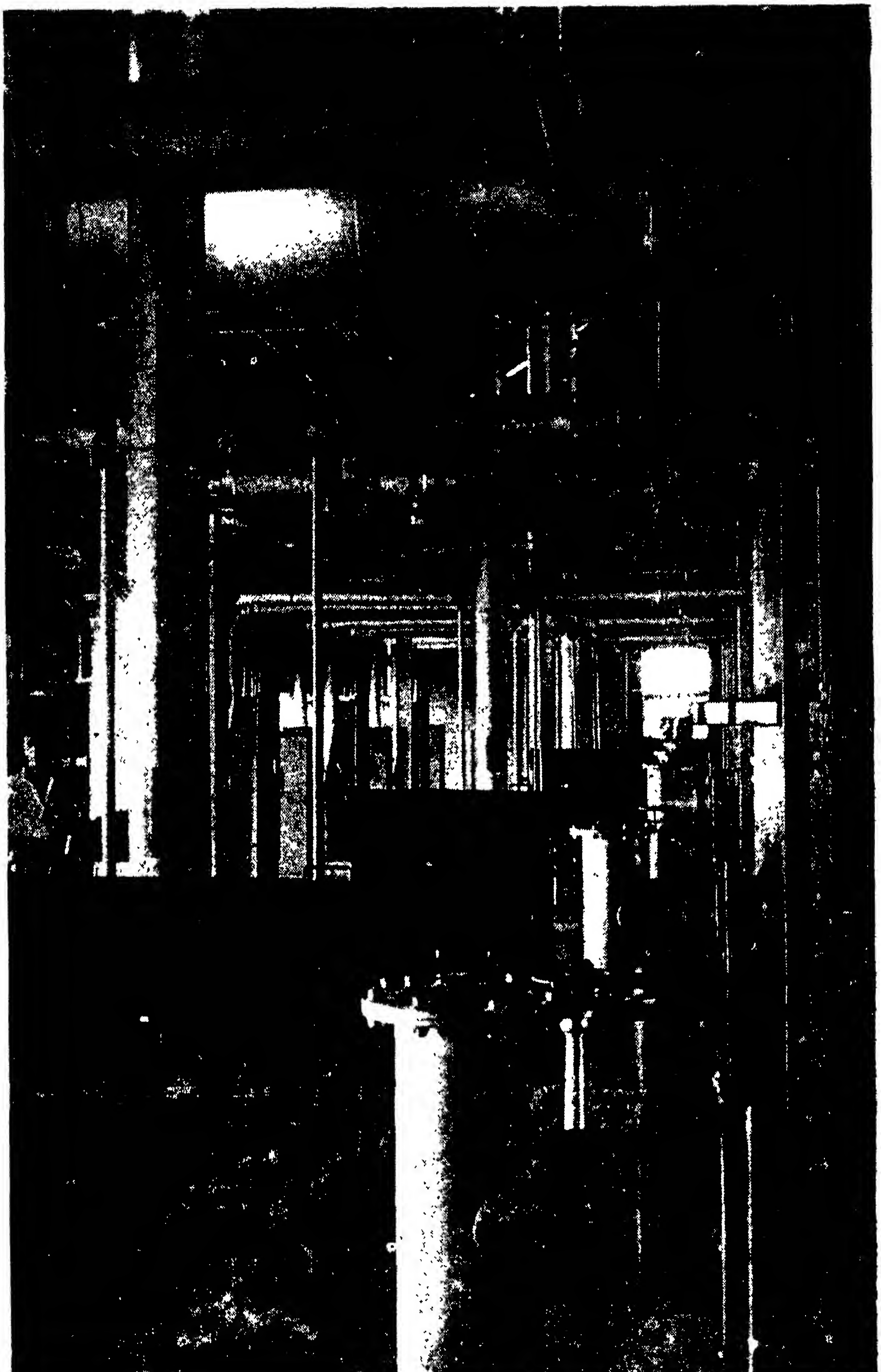
The true Art of Memory is the art of attention.

Samuel Johnson.

Courage Mounteth with the occasions.

William Shakespeare.

GROUP PHOTOGRAPH TAKEN ON THE OCCASION OF THE VISIT OF PRESS REPRESENTATIVES TO THE FACTORY



AN INSIDE VIEW OF THE HYDROGEN SECTION

LC (Elcee) (Ladies' Club?)

IN LIGHTER VEIN

1. It was whispered in Heaven, it was muttered in FACT,
   But my Parker could catch it all soundly intact,
2. The click of the camera and the clap of the hand,
   Ushered in Elcee to this ex-barren land.
3. Just as the Holy Ganges, sprang from Kailas' tresses,
   So our lovely Elcee, grew from watertanks' trusses.
4. Grand was the day and grander the dames,
   Who witnessed the birth of our Elcee with aims.
5. Elcee did some L.C.M.,
   Multiplied and produced hum.
6. Elcee bridged with club and spade,
   With Diamond Heart and head for aid.
7. Elcee played in swimming pool,
   To keep her heart and head quite cool.
8. Well may Elcee use the club,
   As to avoid all bad rub.
9. May your hands grow equally strong,
   To rock the cradle and Right the Wrong.
10. Well done, Elcee, may your tribe increase,
    With leaps and bounds and joy and ease.

With Good Wishes PARKER.

EDITOR'S PERSONAL NOTE

On the eve of severing connections with FACT, I wish to thank all those who have contributed to make this Magazine a useful publication.

It is requested that the same co-operation be extended to the new Editor.

A. N. S. IYENGAR,
Managing Editor.

QUESTION BOX

(In this section answers are given by our Soil and Fertiliser Expert to questions received from the Public on soil, agriculture and use of fertilisers)

Question No. 1.

What is the optimum dose of ammonium sulphate for the potato crop?

Answer:

Potato is an important food crop and its cultivation is mainly confined to the hills (Nilgiris). This crop is a heavy feeder and it demands intensive manuring. A liberal application of both organic and inorganic manures is essential for obtaining maximum production of tubers. The normal dose of ammonium sulphate for this crop can be taken as 2 cwts. per acre. Field experiments conducted by the Madras Agricultural Department have shown that this amount of ammonium sulphate may better be applied in conjunction with groundnut cake, superphosphate and potassium sulphate. An ideal composite dose for potato will be: Ammonium sulphate - 2 cwts., groundnut cake - 400 to 500 lbs; superphosphate - 3 cwts., and potassium sulphate - 2 cwts.

This all round mixture will not fail to yield maximum production. If the soil is acid in reaction it is better to reduce its acidity by applying lime. The proper dose of lime to be applied depends upon the degree of acidity. Normally ½ to 1 ton per acre will suffice, under ordinary conditions. Highly acid soils may demand higher doses. In this connection it must be remembered that lime should on no account be mixed with ammonium sulphate, as there will be loss of nitrogen. Liming should be carried out as a distinctly separate operation, as its main aim is to correct the soil acidity.

Question No. 2

Can you prescribe a remedial measure for the fruit-rot disease of chillies ?

Answer:

This disease is capable of causing serious damage and loss to the chillies crop. It is caused by a fungus, that goes by the name of "Vermicularia Capsici". Under virulent attack the fruits at first become yellow and they gradually rot, ultimately becoming useless. This particular disease can be easily distinguished by the appearance of sunken spots on the fruits and by the peculiar concentric black dots seen on those pits. If remedial measures are not taken in time there may be severe loss.

The most effective method to check this fungal attack is to spray Bordeaux mixture. To be effective, the spraying must be done at the initial stage itself.

Question No. 3.

Will application of ammonium sulphate benefit cocoanut? What is the proper dose per tree?

Answer:

Cocoanut responds well to the application of fertilisers. Generally, cattle manure, river silt and ashes are applied to these trees. In addition to these manures application of nitrogenous fertilisers like ammonium sulphate will immediately infect health into the tree and consequently lead to an increased yield of nuts. Normally 3 to 4 lbs. of ammonium sulphate will be sufficient for a single tree. This quantity may be applied in conjunction with superphosphate (4 to 5 lbs. per tree) and cattle manure (about 100 lbs. per tree). This mixture can be applied broadcast or in a round trench, 1' deep, dug around the tree. To supply potash about 25 lbs. of ash may be applied. This composite dose will be adequate for ensuring maximum yield.

Question No. 4.

How can we control the attack of army worm on paddy?

Answer:

The army worm, otherwise known as the swarming caterpillar, attacks paddy crop, particularly during the early stages of its growth. Generally paddy nurseries are seriously affected and may be completely destroyed, if effective measures are not taken to control it. It derives its name because of its habit of marching from field to field in groups, destroying the young crop all along its path.

An effective method of control is to flood the field completely with the view of drowning the worms. A rope held by its ends may be dragged to and fro in order to dislodge the worms sticking to the plants. If a particular field or nursery is seriously affected a trench may be dug all round it so as to prevent the worms from marching to the neighbouring field. As these worms are seen in groups, they can also be sweeped and then killed.

Question No 5.

Can we increase the yield of pepper vine by the application of artificial fertilisers?

Answer:

Yes. Many experiments have been conducted to determine the response of pepper vine to the application of fertilisers and these field tests have confirmed the efficacy of the fertilisers in enhancing the pepper yield. It must be remembered that pepper is a perennial crop. Ammonium sulphate can be applied to pepper at the rate of 5 ozs. per vine. This quantity can better be applied in conjunction with superphosphate and potassium sulphate, all in equal doses of 5ozs. In the absence of potassium sulphate, ashes may be applied.

Pepper is chiefly confined to the West Coast areas, which are deficient in lime content. Hence liming will not fail to increase the yield of pepper. Liming can be done at the rate of about 6 ozs. per vine. (As mentioned earlier liming and 'sulphating' must not be carried out simultaneously).

Personnel Effects & Infections

(P. B. Menon, Safety Engineer)

PERSONNEL EFFECTS & INFECTIONS

The following are some of the golden rules of safety to be observed by the employees. Strict and religeous observance of these rules ensures the safety of the personnel, and saves unnecessary loss of time and worry due to accidents.

1. Do not wear loose clothing. It may catch in moving machinery and endanger the wearer.

2. Clothing not worn on the job will be placed in designated locations and not left lying around.

3. Keep your goggles in good repair. Return to the Store-room any that may have broken lenses or be of improper fit.

4. Be sure the correct type of Canister is attached to your gas mask before you make use of the same and remove small metal plate at bottom of the canister to open inlet.

5. Use shoulder pads when carrying heavy articles on your shoulder.

6. Protect your head with a hat or cap whenever in the plant; acid drips or caustic leaks may cause serious head injuries.

7. Do not carry sharp pointed tools in your pocket.

8. Check rubber gloves for holes before use to prevent possiblity of leakage.

9. Wearing shoes is a prevention to toe injuries.

10. Be cautious of possible Hernia injury when lifting or pushing heavy weights.

11. Keep your cloths neat and orderly in your locker.

INFECTIONS

1. Infection is poison caused by germs. These germs may exist in either open or closed injuries. When germs multiply excessively or enter the blood stream the condition is immediately dangerous.

2. Every skin puncture or laceration should be reported immediately to the dispensary, as exploration and sterlization are essential.

3. Bruises, bumps, pinches, though the skin is not broken, may cause tissue injury with resulting inflammation; infection frequently follows.

4. Skin irritations afford opportunity for germs to enter the system. This condition may be caused by materials with which you work or by your physical condition.

5. Eye infections may result from sties, granulated lids, inflammation, fumes, liquids, or any injury. Neglect may mean disaster.

6. Colds and contagious diseases are germ infections dangerous to your associates.

7. When any of the above conditions are recognised, go at once to the dispensary.

8. Exchanging or using personal protective equipment in common with others, without sterilization, is a possible means of spreading infection. Any goggles, gloves, respirators etc. which you have used should be handed over to the safety or dispensary for sterilization.

9. Coughing, sneezing and spitting in assembly places or the pollution of drinking fountains and toilets contribute to the spread of infections. When you cough or sneeze always use a handkerchief.

EYES

1. Do all you can to protect your eyes. Sight is your most useful "sense".

2. In case of injury go at once to the dispensary, except when splashed with acid or alkali. In these cases flush liberally with water. Then go to the dispensary.

3. Approved goggles, furnished by the Company, shall be worn where required: example - splashing materials, grinding, chipping, cutting, welding or any other operation which may release flying particles, dust etc.

4. Headaches, indigestion, and nervousness frequently indicate eyestrain; defective vision may be the cause. Report to the dispensary.

5. Neglected eye injuries may result in serious infection ulcers, blindness or death.

6. Do not look directly into a welding flame even for a few seconds. Wear the proper protective material when welding and cutting.

I recommend you to take care of the minutes, for the hours will take care of themselves.

Lord Chesterfield.

No man is so wise but may easily err, if he will take no other counsel than his own.

Ben Fonson.

FACT NEWS

PROCEEDINGS OF THE PRESS CONFERENCE HELD AT F. A. C. T. ON NOVEMBER, 1, 1947.

"I was very much impressed by the work of the Fertilisers & Chemicals, Travancore Ltd. and the Forest Industries, Travancore Ltd., and wish to thank the management for giving us the opportunity and facilities for this visit", remarked the Hindu Representative speaking at a Press Conference held at Alwaye, wherein representatives from different daily news papers and magazines attended. Among other important invitees were Dr. K. P. P. Menon, the Government Director and Messrs. L. C. McCarty, Jr., and H. G. Felio of The Intercontinent Corporation, the contractors for the design, procurement and installation of this plant.

Mr. V. Seshasayee's opening address is published in full elsewhere in this issue. At the conclusion of the address, Mr. Seshasayee requested the Press Representatives to put in questions which they would like to by way of clarification of any doubts The questions were suitably answered by Dr. Menon and Mr. Seshasayee. Given below are some of the important questions and answers:—

Question 1. Is the use of chemical fertilisers here so well established as in the States ? (U. S.)

Answer. India has been importing many times more than she is producing. The quantity of Ammonium Sulphate now being produced here is being marketed immediately and indications are that even when we produce at full rated capacity there would not be any difficulty in marketing the fertilisers.

Question 2. Is the price of Ammonium Sulphate manufactured here competitive with the imported Ammonium Sulphate?

Answer. We can compete with the imported stuff if all the normal facilities which are not yet available, are given to us. The following are some of the handicaps we have been facing:—

a) We need every day 300 tons of firewood here whereas we have been able to get only 200 tons per day up till now due to want of petrol, oils etc. for the transport of the firewood.

b) While Ammonium Sulphate is imported to India duty free, the machinery and equipment that are used for the manufacture of Ammonium Sulphate are burdened with duty. We have todate paid Rs. 18 lakhs in the form of duty alone which increases our capital to that extent. Mr. N Gopalaswami Ayyangar, our Chairman and now a Minister in the Central Government, has already represented to the Government of India emphatically on this point. Dr Rajendra Prasad, when he was here, also promised to give sympathetic consideration to

this point. But, however, unfortunately no orders have been passed yet for the refund of the duty.

c) In addition, we are paying duty in several other forms, in the form of duty on fuel or furnace oil which comes to about 11 to 12 rupees a ton, and which is the main fuel here for generating the required amount of steam. With a view to conserve coal and coke we have been using oil-fired boilers. Incidentally we may also mention that the price of fuel oil has increased by about Rs. 21/- per ton since the date we entered on a contract for the supply of the plant and machinery. We need about 14000 to 15000 gals. of petrol every month and on every gallon of petrol we are paying a duty of As. 10/-.

While the railway have a concession rate of freight for Ammonium Sulphate, the materials that go to make this Ammonium Sulphate do not have the same concession.

In spite of all the handicaps, we expect, when we enter into full production that our price will not exceed the price of the imported fertilisers.

Question 3. What is the market for Ammonium Sulphate in Travancore ?

Answer. At present Travancore is using about 5000 tons per annum, but in view of bringing in more lands under cultivation and to increase the yields per acre, we expect to market at least 10,000 tons per annum in the near future.

Then Dr. K. P. P. Menon gave an explanation as to why when the demand was only 10,000 tons in Travancore, a 50,000 tons plant was installed here. It was stated that for chemical factories there is an optimum limit at which level only we can manufacture chemicals at an economic rate. It was found out that a factory of smaller production than this would result in proportionately more costly final product.

Question 4. The Hindu Representative asked Dr. Menon, if as Government Director, he was in a position to give assurances that this factory would prove a successful and economical scheme ?

Answer: Yes; while considering the economics of a plant of this nature there are several factors. Firstly this factory is a utility venture and is not intended to get huge profits to the shareholders.

As an example it might be stated, if we sell Sulphuric Acid and ammonia as such, we will make considerably more profit than combining them to form Ammonium Sulphate and then marketing the Sulphate.

We have demands for Ammonium Sulphate at the rate of Rs. 400/ and even Rs. 500/- a ton whereas we have been committed to an agreement with the Governments to supply them at the rate of Rs. 320/- per ton. As already stated in reply to Question No. 2, we have been burdened with heavy duties for machinery, equipment and raw materials which if refunded to us would improve our financial position.

NEWS & NOTES..........in brief

SHORTAGE OF FERTILISERS FOR PLANTATIONS.

The position regarding supplies of fertilisers to plantations, it is understood, is becoming increasingly difficult and has been a source of anxiety to large numbers of tea and coffee planters who are unable to get even their barest minimum requirements for the current season. Among the chemical fertilisers needed for the proper upkeep of plantations are sulphate of ammonia and phosphate of ammonia. The supply of these categories of fertilisers has been extremely short of demand and recently the Government of India allotted a new fertiliser, ammonuim nitrate, as a substitute for a certain amount of sulphate of ammonia which was difficult to obtain. There are reports that this particular variety of fertiliser is unsuitable for some plantations and that it presents difficulties in the way of storing. But in spite of this it has not been possible for estates to obtain even the quantities promised to them by Government in 1946-47.

Among the indigenous fertilisers groundnut-oil cake is very much in demand, since plantations use this in mixtures. Owing to the high priority given to foodcrops Government has not been able to meet even the minimum requirements of plantation crops and in Madras there is control over the supply of this cake to plantations. One result of this control is that the various manure mixing firms are obliged to buy cake from outside the Province at prices very much in excess of the controlled price and supply it to plantations.

The shortage of both imported and indigenous manures is having a serious effect upon crop production.

HIRAKUD PROJECT TO BE TAKEN UP IMMEDIATELY.

The Government of India will grant a loan to the Orissa Government to cover the capital cost of the Hirakud Dam Project which is estimated to come to Rs. 47·81 crores. The Central Waterways Irrigation Navigation Commission which made the preliminary investigations of the scheme will undertake the construction of the project as agents of the Government of Orissa.

The problem of resettling the peasants of the 163 villages containing 70,000 acres is being favourably considered.

MINERAL POLICY.

Answering some questions recently regarding the policy of the Government of India towards industries in general and minerals in particular and to the allegations

that industries were working in an atmosphere of uncertainty, Mr. Gadgil, Minister for Works, Power and Mines has replied that there was no uncertainty. He said that the Government had a definite policy so far as nationalisation of industries was concerned. As regards the policy with reference to other industries, he drew attention to the various policy commitees, including the one for mineral, and to the policies these committees had laid down with regard to the respective industries. Regarding minerals the Central Government was only anxious in particular that there should be the largest amont of provincial cooperation for implementing those policies. He gave assurance that no legitimate interst in industry would be adversely affected or acquired without proper and adequate compensation. But adjustments and modifications in the present outlook of industries are essential. He deplored the present trend in industries which, he said, was to restrict production so that profits might go up. He emphasised that the Government believes in abundance. This might mean smaller profits, but the society would not feel hereafter that it was being run in a way in which few made most and most made few.

Regarding a policy for minerals, Mr. Gadgil said that in the past there had been no action not for want of knowledge but on account of the lack of a comprehensive policy, which alone could give directions to the mass of uncorrelated recommendations on a variety of questions by various committees. Only then were they seeing such a comprehensive outlook. The Government accepted the recommendations of the Mineral Policy Conference held in January 1946. After giving in brief the objectives of the policy Mr. Gadgil next said that the Government was now thinking of implementing that policy. It was only elementary that there should be a central organisation for putting into practice its various facts. The Government was therefore now thinking of setting up a comprehensive technical organisation which should be in a position to (a) work out the implications of our policy as regards improved production, processing and marketing of our minerals of national importance, (b) to offer guidance and supervision to Provinces at the early stages of their exploitation of key minerals, (c) to assist the Provinces in the establishment of similar technical organisations for the development of their local resources and (d) to carry out and co-ordinate mineral and metallurgical research on an all-India basis.

UNITED STATES POSTAGE.

The Martin 2-0-2 has been honoured by being pictured on a United States postage stamp. The 2-0-2 appeared on a new 10 cent value which went on sale on August 30. The airplane is shown over the Pan-American Building in Washington. Stamps will be particu-

larly used on mail to Central and South American countries.

HYDRO-ELECTRIC POWER PROJECTS.

The Minister for Public Works, Dr. M. D. D. Gilder, revealed in the Bombay Legislative Council that the proposed Kalinadi Hydro-electric Project to serve the Karnataka Districts of the Province when completed would be capable of releasing 340,000 kilowatts of electric energy. From that point of view it would be even a bigger scheme than the proposed Koyna Valley Scheme intended to serve the Satara and Belgaum Districts. The Minister said that a preliminary survey regarding the Kalinadi Project had now been completed and a detailed survey would soon be undertaken. The reason why Government had to go in for an undertaking of this type was that the Province was able to get only a limited supply of power from the Jog Falls in Mysore State and that too at a high price and after five years Government would have to find out another source of energy. The scheme would involve the construction of four different dams and five power stations. If the scheme was finally undertaken it would be the biggest hydro-electric project in the Province. Dr. Gilder said the previous administration had contracted with the Mysore Government for the supply of power from the Jog Falls on certain terms. A special officer, who had gone into the matter, had reported that even if the present supply from the Jog Falls were to be doubled it would not meet the growing needs of that part of the Province and after some time Government would have to think of an alternative scheme. It was at this stage that Government had received the report of the preliminary survey on Kalinadi Project. Therefore, Government had come to the conclusion that it would supply power from the Jog Falls only to places which could get the supply economically.

HUGE IRRIGATION AND HYDRO-ELECTRIC SCHEME.

A huge irrigation and hydro-electric scheme, which will be the biggest in Australia and will cost 65 million Australian pounds provides for the diversion of the Snowy River into the Murray.

The 1,500-mile Murray River, with its tributaries the Darling and the Murrumbridgee, forms the only sizeable inland river system in Australia but at certain times of the year its waters fall very low while the Snowy is in floods.

A 25-mile tunnel will be cut through the Australian Alps to connect the Snowy, which runs East, with the headquarters of the West-flowing Murray.

As the tunnel will fall 2,000 feet, a series of power stations will generate a total of 750,000 H. P.

To generate a similar amount of power by the normal method

would require 2 million tons of coal a year.

As the Snowy will give the Murray a guaranteed water supply throughout the year, millions of acres of semi-desert country may be opened up under irrigation.

Areas now irrigated by the Murray provide the bulk of Australia's dried fruits crop.

INDIA'S REQUIREMENTS OF MANURES AND FERTILISERS.

India needs approximately 1,500,000 tons of nitrogen per annum for all crops according to a spokesman of the Ministry of Agriculture. As against this, the total nitrogen avilable from cow dung is 320,000 tons. There is therefore an overall shortage of about 1,250,000 tons. Even if 50 percent ofoilcake produced in India could he utilised for manurial purposes India would still be deficit in nitrogen by 1,000,000 tons per annum. Green manures and town composts are other sources of nitrogen, but while the former can be grown only under specific conditions, the latter is used mostly for market gardening.

Till the country is able to manufacture its own requirements of sulphate of ammonia, chemical manures will have to be imported from abroad. Nitrogenous manures are controlled by the International Emergency Food Council. On the basis of an increase in grain production by 3,000,000 tons in 1951-52 India requires 800,000 tons of sulphate of ammonia in the current year, against which she is not likely to secure more than 100,000 tons. It is necessary therefore to give facilities to the existing factories to expedite the manufacture of chemical fertilisers as well as to encourage the starting of additional plants.

A BIG IRRIGATION PROJECT OF THE SOUTH

The Rampadasagar Project across the Godavari is a tremendously big venture with great potentialities. Besides resulting in an increase in rice production by a million tons per annum, it would help save coal by power production, and give scope for a number of heavy industries. The navigation facilities it is expected to provide, would extend to the very heart of the sub-continent, south of the Vindhyas.

A MULTI-PURPOSE PROJECT.

The dam is to be sited 2 miles above the village of Polavaram, 20 miles from Rajahmundry on the on the Madras-Calcutta line. 400 ft. high from the foundation, the dam is to be built in two halves with a small hill in the centre. Canals are to take off from the left and right flanks of the dam to irrigate 23 lakhs of acres in the five districts of Vizagapatam, East and West Godavari, Kristna and Guntur. A hydro-electric generating station is to be erected at the right flank below the dam capable of producing 100, 000 to 150, 000 K. W. of electric energy. The canal to the north would open up a line of

navigation from Vizag Harbour to the Godavari and through the Reservoir to the hinterlands of Hyderabad and Central Provinces. The reservoir having a water spread of 527 sq. miles would comprise of 189 sq. miles in Hyderabad State, 316 sq. miles in Madras, 16 sq. miles in Bastar States (Central Provinces) and 14 sq. miles in Jeypore (Orrisa).

CONSTRUCTION OF THE PROJECT

Having in view the unquestionably difficult river diversion and foundation excavation problems, the Madras Government have felt that the construction of the dam should be entrusted to fully competent and experienced contractors. The Consulting Engineers of the Goverment had invited various contracting firms in England and America to send their credentials in the matter of their previous experience. The final selection will be made by Government either after calling for tenders or by negetiations.

If the dam is to be completed in a period of eight to nine years, every day about 6000 cubic yards of concrete are to be laid to build the body of the dam. To do this up-to-date mammoth stone-crushers, belt-conveyors, batching plants, hammer-head and whirler cranes are required. More than 100 to 150 huge pumps have to work day and night for dewatering purposes. Perhaps it is the first time that Indian Engineers are to handle a scheme of such vast proportions. "Time honoured methods would have to give place to revolutionary ways of construction and speeding up of works" was the phrase used by Mr. Govindaraja Aiyangar, Special Chief Engineer for this Project to the Madras Government while referring to the great difficulties of construction. It was imperative, he said, that certain steps like the collecting of the plant and machinery needed for the first one or two years, construction of camps and buildings, land acquisition, construction of a pontoon bridge across the river at the site, establishment of a big workshop, and building of a cement factory with a 500 ton capacity was to be taken up immediately if the construction of the dam was to begin by the end of 1948 in the low-water season. It is heartening to learn from the Minister for Public Works to the Government of Madras, that the scheme will be put through and it only remains to find out ways and means of financing it for which the Government are having consultations with the Centre.

ESTIMATED COST

The dam is estimated to cost Rs. 40 crores, and including the power plant, canal headworks, navigation locks and reservoir right of way the cost would be Rs. 53 crores. The canals would cost Rs. 27 crores, and the establishment and other charges amounting to six crores would bring the total cost to Rs. 86 crores. The dam when completed is bound to prove a great national venture with an estimated life for 500 years.

FACTS THAT INTEREST

PHENOL PRODUCTION IN U. S. A.

A plant for the production of synthetic phenol from monochlorbenzol by a continuous process has been put into operation by the Chemical Department of the General Elec'ric Co. at Pittsfield, Mass., U. S. A.

The plant makes its own chlorine and caustic in Hooker Type cells. The cell feed is made from rock salt which is converted into a brine and purified. Chlorine is used for chlorinating the benzol, and caustic soda for hydrolyzing the monochlorbenzol.

Caustic effluent from the cells is evaporated to 20 per cent and the salt crystals separated. Caustic is then diluted to 10 per cent and held for use in hydrolyzing the monochlorbenzol. Chlorine leaving the cells at 180 degrees. F. is passed through a heat exchanger cooling it to 55 degrees. The gas is next dried and compressed to 20 lbs. and goes directly to the chlorinator. Here it comes into contact with benzol and monochlorbenzol is formed. Gases leave from the top of the chlorinator. The hydrochloric acid is removed for use in neutralising sodium phenolate in the formation of phenol. The liquid leaving the chlorinator is composed of unreacted benzol, monochlorbenzol and dichlorbenzols. It is neutralized and then the components are separated. The monochlorbenzol, caustic and diphenyl ethe. are mixed in the emulsifying tankr The mixture is compressed to 4,000 lbs. per sq. in. The temperature of the mixture is raised to 500 degrees F. in a heat exchanger. It then goes to the reactor. The feed first enters the radiant section of the tubular reactor and the temperature is brought up to reaction temperature. In the conversion section. the reaction mixture is held at the high temperature until the reaction is complete. Substantially all monochlor is reacted to sodium phenolate, diphenyl ether or high boiling residues. The mixture is cooled and the pressure reduced. In a decantor the diphenyl ether is separated. Phenolate is neutralized with hydrochloric acid forming brine and phenol. There are two layers formed, a brine layer and a phenol-water layer. The phenol in the layers is recovered by distillation and sent to storage from which it it shipped in tank cars to the resin plant of the company, a few miles distant

MECHANISATION INCREASES RICE YIELD.

Rice growers in California have developed a new type of fully mechanized rice culture which has turned the airplane into an agricultural tool and, because of its high efficiency, is invading rice areas. in the American South on a large scale.

California's air-seeding method provides an average yield of 3,000 pounds per acre, and in some areas reaches an exceptional 6,000 pounds per acre. This compares with the 2,000 pounds per acre which all rice-growing areas in the United States average and which intensive cultivation in the West provides.

Every year during the month of May, highway troopers in the valley north of Sacramento, California listen patiently to complaints of motorists having "practically to dodge low-flying plane-buzzing over the heads of unsuspecting travellers." However justified the complaints might appear, they impress neither the highway police, the pilots nor the local population. For the planes most of them double-wingers some 15 or 20 years old and the pilots who are not much older have become as essential to the communities in the fertile plain as the irrigation lock, the plough and the harvester combine. They are a new agricultural tool that during the past five or ten years has made the fields between the Sacramento and the Feather Rivers a highly productive rice region.

Yields of all rice-growing areas in the United States averaged in 1946 roughly 2,000 pounds per acre equivalent to the results of intensive Eastern cultures. In California, the average yield reached about 3,000 pounds per acre, with some choice paddies producing 6,000 pounds per acre. Part of the high figure is due to rich fertilization; but the airplane seeding and other machine methods are equally credited with contributing to higher yields. Mechanization, which has all but revolutionized the ancient and cumbersome transplanting of seedlings by hand, was perfected without loss of productivity per acre.

"We have had a peculiar problem here in California," explains Glenn Harris, a rice grower from Richvale. "In order to control water grasses and other weeds we found we had to keep our land submerged under water for the whole growing season, that is to say from seeding to near harvesting We found that the only satisfactory method for getting the seed into the water was by dropping it from the air. That is how we got to working out the new way, and that is why the planes buzz across the paddies all during May.

Growing under water remains the only similarity between the old rice culture and the air-brone mechnization used in California today. The method is as typically American as the thorough power-driven mechanization which has been applied to wheat and other produce all over the United States. Based on large-size paddies and dependent on the state's huge irrigation system that has transformed what was once desert land into fertile mass producing farms, it is typically Californian.

"For our method we need a lot of water," continues Glenn

Harris. "Weed roth can be controlled only if the water is deep enough to keep the weeds down - the rice will come through, all right."

Mechanized rice growing starts early in the year when the snow begins to thaw in the Sierra Nevoda Mountains While the huge reservoirs behind Shata Dam, around volcanic Mt. Lassen and in many high valleys fill to capacity down in the broad plains, but for 15, or 20 inches· yearly precipitation, little snow or rain moistens the soil.

The land is dry and hard enough to sustain heavy machines Tractor-pulled plough, harrows and "floats" with spikes or peg teeth turn over the soil and crumble the clods. Dust travels behind the machines in pillar - shaped clouds, settling on the Eucalyptus groves at the paddies' edges, left there to break the force of mountain winds.

Late in April and May the dam locks open and precious water rushes to the rice fields through canals and ditches.

For seeding is no longer done before flooding the fields. In previous years, seed was scattered mechanically on dry ground and the land was flooded afterwards. But much of the seed got lost between crevices in the blods of dirt; or, covered by only a bare fraction of an inch failed to germinate and push through the water. Today paddies are flooded before a single kernel of rice has been planted in the ground.

(Indian Spectator.)

CARBON-DIOXIDE AS MOTIVE POWER.

To American Model Makers the advent of jet propulsion has opened a wonderful new world. Long limited to rubber bands and tiny gasoline engines as sources of motive power, they have now begun to switch over to the metal carbon-dioxide cartridges used to charge soda water bottles. When one of these cartridges is fastened to a model racing car, the blast of escaping gas from its rear sends the tiny car whizzing down a long track at better than 100 mph.

Students at Cal Aero Technicrl Institute at Glendale, Calif, build these model racecars. In designing their race cars they pay the most careful attentoin to aerodynamics and methods of aircraft construction. They race cars regularly, fastening each one to a guide wire to prevent it from hurtling into the crowd at high speed. At their last meeting one car was clocked at 120 mph.

FERTILISERS: FRIENDS OR FOES ? *

Particularly in recent years, virulent and unprovoked attacks have been made on the practice of using fertilisers. It is claimed that they poison the soil and are injurious to the health of plants, animals and human beings.

* From Presidential Address, entitled, 'Soils and Health' to Section M (Agriculture) of the Annual Meeting of the British Association, held at Dundee from Aug. 27—Sept. 5.

There are various degrees of belief. Some regard even lime with suspicion. Some would allow ground mineral phosphate but would object to potash salts. Even basic slag is acceptable in certain quarters, but superphosphate is anathema, probably because sulphuric acid is used in its manufacture and also because of the erroneous belief that superphosphate renders the soil acid. The most intense dislike, however, is reserved as a rule for sulphate of ammonia, possibly because at one time it was all made from gas works liquor.

The opponents of fertilisers hold their beliefs with religious fervour and those who disagree with their assertions are often accused of having unworthy motives and being in the clutches of the fertiliser interests, or have attributed to them views which they do not hold for instance, that they neglect organic manures and discourage their use. It is not a case of choosing between organic manures and fertilisers. Both have their uses and they should be regarded as complementary.

LAND NOT IMPOVERISHED

The charge is often made that those who use fertilisers are exploiting the fertility of their land, using up its organic matter aud leaving it in an impoverished condition. The reverse is, in fact, the case. Fertilisers properly used build up fertility making good what is taken out in crops or by stock and what is lost through drainage. By enabling larger crops to be grown, fertilisers increase the amount of material which can be converted into farmyard manure, and the greater amount of roots left as residues by the larger crops also increases the organic matter in the soil. The fact that it requires intelligence to derive full advantage from fertilisers should not be accepted by farmers as a sufficient reason for not using them.

Soil erosion is sometimes attributed to the use of fertilisers. It certainly occurs in some regions where fertilisers are used extensively, for example, in the Cotton Belt of America, but in the notorious "Dust Bowl" the average annual consumption of fertilisers just before the war was less than two pounds per acre of crop. In both places the erosion has been due to the system of farming and not to the fertilisers. The remedy for many of these bad farming systems will be found in resting the land under leys or cover crops. To establish these crops successfully it will often be necessary to introduce fertilisers as the United States is now doing so enthusiastically and efficiently in its soil conservation schemes.

EFFECTS ON SOIL ORGANISMS AND EARTHWORMS

The claim is often made that fertilisers have an adverse effect on the bacteria, actinomycetes, protozoa soil fungi and other organisms in the soil. Careful tests, however, made on the classical plots at Rothamsted have given us evidence

that the application of in organic fertilisers, even for many successive years, has not had any deleterious effect on the soil micro-population. An improvement in physical conditions or in mineral nutrient supply is thus beneficial alike to the crop and the micro-population of the soil.

It is also contended that fertilisers reduce the earthworm population of the soil, but this is not borne out by recent work at Rothamsted. The highest earthworm populations are on areas where there is abundance of suitable organic matter on which they feed, but the application of fertilisers, even in abnormally heavy and frequent dressings, has no adverse effect provided the soil has not been allowed to become too acid- a condition which can be remedied by liming.

RESISTANCE OF CROPS TO DISEASE

It has been alleged that fertilisers increase the liability of crops to insect, fungus and virus attacks, but again, there is no sound evidence ot support this. At Rothamsted, although slight differences have been found in the level of infestation of medow foxtail, and wheat by the foxtail and wheat blossom midges, these differences can be accounted for by the extra number of grass and wheat ears on the plots. Thus the nitrogenous plots on Broadbalk have more gall midges on them but also more ears of wheat. There is no evidence of a greater percentage attack.

Conversely, unbalanced manuring can lead to an actual increase in the incidence of attack. In the case of barley, lack of superphosphate retards the growth of the plant, and consequently the infestation of barley by the gout fly is increased.

Another assertion is that fertilisers have a detrimental effect on the composition and quality fo agricultural produce. The composition of crops can certainly be influenced by a number o ffactors, including manuring, but there is no conclusive evidence to show that organic manures have any special effect, beneficial or toherwise, compared with fertilisers.

QUALITY OF AGRICULTURAL PRODUCE

For instance, tests carried out some years ago, at the Dunn Nutritional Laboratories in Cambridge, showed that the vitamin-B1 potency of wheat grown at Rothamsted on plots which had received heavy annual dressings of fertilisers for over ninety years was at least equal to that from the plot which had received fourteen tons of farmyard manure annually over the same period. A similar result was obtained for barley from the classical Hoos field and potatoes grown in a normal rotation which were tested for vitamin C showed no difference whether grown with dung or sulphate of ammonia.

Probably more can be done for the improvement of health in the world today by providing ample supplies of food than in any other way, and the propagation of unfouned beliefs about the harmful effects of fertilisers is detrimental to the interests of the whole community.

Extract from "The Chemical Trade Journal and Chemical Engineer" — No. 3144 — Vol. 121 — September 5, 1947 — Pages 241 — 242.

എഴുത്തുപെട്ടി.

ഉരുളക്കിഴങ്ങു കൃഷി ഏററവും വിജയകരമാക്കിത്തീക്കുന്നതിനു ചേക്കേണ്ട അമ്മോണിയം സൾഫേററിൻെറ അളവു് എത്രയാണു്?

ഉത്തരം:— കിഴങ്ങുവഗ്ഗങ്ങളിൽവച്ചു് അതിപ്രധാനമായ ഒന്നാണു് ഉരുളക്കിഴങ്ങു്. സാധാരണയായി നീലഗിരി മുതലായ മലംപ്രദേശങ്ങളിലാണു് ഇതു കൃഷിചെയ്തുവരാറുള്ളതു്. ഇതു് ആളുകൾ ധാരാളമായി ഉപയോഗിക്കുന്നു. വിജയകരമായി ഇതു കൃഷിചെയ്യുന്നതിനു് ധാരാളം വളം അത്യന്താപേക്ഷിതമാണു്. കിഴങ്ങുവഗ്ഗങ്ങളുടെ കൃഷി ഏററവും ഫലപ്രദമായിത്തീരുന്നതിനു് കൃത്രിമങ്ങളും അകൃത്രിമങ്ങളുമായ വളങ്ങളുടെ നിർല്ലോഭമായ ഉപയോഗം അനുപേക്ഷണീയമാണു്. സാധാരണതോതിൽ ഈ കൃഷിക്കു് ഒരേക്കറിനു് 2 Cwt. അമ്മോണിയം സൾഫേററുവീതം ഉപയോഗിക്കാം. മദ്രാസ്സ് ഗവമ്മെൻറു് കൃഷിഡിപ്പാട്ടുമെൻറു നടത്തിയിട്ടുള്ള പ്രായോഗികപരീക്ഷണങ്ങളിൽ അമ്മോണിയം സൾഫേററിനോടു കൂടി നിലക്കടലപിണ്ണാക്കു് Super Phosphate Potassium Sulphate ഇവ കൂട്ടിക്കലത്തി ഉപയോഗിക്കുന്നപക്ഷം അതു കൂടുതൽ ഫലപ്രദമായിത്തീരുമെന്നു് കണ്ടുപിടിക്കപ്പെട്ടിട്ടുണ്ടു്. ഉരുളക്കിഴങ്ങു കൃഷിക്കു് ഏററവും അനുയോജ്യമായ രീതിയിൽ താഴെ കാണിക്കുന്ന തോതിൽ വളം ചേക്കാവുന്നതാണു്.

Ammonium Sulphate 2 cwt.
നിലക്കടലപിണ്ണാക്കു് 400 to 500 lbs.
Super phosphate 3 cwt.
Potassium Sulphate 2 cwt.

ഇപ്രകാരം കൂട്ടിക്കലത്തിയ വളം തീച്ചയായും അതിശയകരമായ ഫലത്തെ പ്രദാനം ചെയ്യാതിരിക്കയില്ല. മണ്ണിൽ ആസിഡിൻെറ അംശം കൂടുതലുണ്ടെന്നു ബോദ്ധ്യപ്പെടുന്നപക്ഷം കുമ്മായം ഇട്ടു് ആ ശക്തി കുറയ്ക്കുന്നതു നല്ലതാണു്. ആസിഡിൻെറ അംശത്തിൻെറ അളവനുസരിച്ചു് കുമ്മായത്തിൻെറ അളവും ക്രമപ്പെടുത്താം. സാധാരണയായി ഒരേക്കറിനു് അരടൺ മുതൽ ഒരുടൺ വരെ ഉപയോഗിച്ചാൽ മതിയാകും. ആസിഡിൻെറ അംശം മണ്ണിൽ എത്രയും വദ്ധിച്ചു കാണുന്നുവോ അത്രയും കുമ്മായത്തിൻെറ അളവും വദ്ധിപ്പിക്കണം. യാതൊരു കാരണവശാലും കുമ്മായം അമ്മോണിയം സൾഫേറേറാടുകൂടി കലത്താൻ പാടില്ല. അങ്ങനെ ചെയ്യുന്നപക്ഷം ഏററവും ആവശ്യമായ Nitrogen അതിൽനിന്നും നഷ്ടപ്പെടുന്നതാണു്. കുമ്മായം മണ്ണിൽ കലന്നിട്ടുള്ള ആസിഡിൻെറ അംശത്തെ ക്രമപ്പെടുത്തുന്നതിനു് ഉദ്ദേശിച്ചിരിക്കുന്നതാകകൊണ്ടു് അതു് അമ്മോണിയം സൾഫേറേറാടുകൂടി കലത്താൻ പാടില്ല.

ചോദ്യം 2. മുളക് അതിൻെറ ചെടിയിൽ നിന്നുതന്നെ അളിഞ്ഞു പോകുന്നതിന് താങ്കൾക്ക് എന്തെങ്കിലും ഒരു പ്രതിവിധി ഉപദേശിക്കാമോ?

ഉത്തരം:— മുളകുകൃഷിയ്ക്കു പൊതുവെ നാശവും തന്മൂലം നഷ്ടവും ഉണ്ടാക്കിത്തീക്കാൻ പര്യാപ്തമായ ഒരു ഉപദ്രവമാണ് ഇതു്. Veremicularia Capsici എന്നു പറയുന്ന ഒരുതരം ജന്തുക്കളിൽ (Fungus) നിന്നാണ് ഈ ഉപദ്രവം ഉണ്ടാകുന്നതു്. സാരമായ രീതിയിൽ ഉപദ്രവം ഉണ്ടാകുന്നപക്ഷം മുളകുകൾ ഒരുതരം മഞ്ഞനിറത്തിൽ രൂപാന്തരപ്പെടുകയും, ക്രമേണ അതു ചീഞ്ഞു് ഉപയോഗശൂന്യമായിത്തീരുകയും ചെയ്യുന്നു. മുളകുകളിൽ ഉണ്ടാകുന്ന ചെറിയ ചുളിവുകളും അവയുടെ മദ്ധ്യത്തിൽ ഓരോ കറുത്ത പൊട്ടുകളും കണ്ടുതുടങ്ങുമ്പോൾ ഈ ഉപദ്രവം നിഷ്പ്രയാസം മനസ്സിലാക്കാൻ സാധിക്കുന്നു. അതിന് താമസംവിനാ പ്രതിവിധികൾ ചെയ്യാതിരിക്കുന്നപക്ഷം അതു സാരമായ നഷ്ടത്തിനു കാരണമാക്കുന്നതാണ്. ഈ ഉപദ്രവത്തെ വിജയകരമായ നിലയിൽ തടയുന്നതിനു "Bordeaux Mixture" തളിച്ചാൽ മതിയാകുന്നതാണ്. പക്ഷെ ഈ പ്രതിവിധി മേൽപറയപ്പെട്ട ഉപദ്രവത്തിൻെറ ആരംഭത്തിൽതന്നെ ചെയ്താൽ മാത്രമേ ഫലമുണ്ടാകയുള്ളു.

ചോദ്യം 3. തെങ്ങുകൃഷിക്ക് അമ്മോണിയം സൾഫേറ്റു് ഉപയോഗപ്രദമാണോ? ആണെങ്കിൽ ഒരു വൃക്ഷത്തിനു ചേക്കേണ്ട ശരിയായ അളവെത്രയാണ്?

ഉത്തരം:— വളങ്ങൾ സാധാരണമായി തെങ്ങുകൃഷിയ്ക്കു് നല്ലതായിട്ടാണ് കണ്ടുവരാറുള്ളതു്. സാധാരണമായി ചാണകം, എക്കൽ, ചാരം മുതലായവ ഇതിലേക്കു ഉപയോഗിക്കാറുണ്ട്. ഇതോടുകൂടി Nitrogen ധാരാളമായി ചേർന്നിട്ടുള്ള അമ്മോണിയം സൾഫേററ് ഉപയോഗിക്കുന്നപക്ഷം അതു് തടിയിൽ ശരിയായ ശക്തിയും മുഴുപ്പും വർദ്ധിപ്പിക്കുകയും തന്മൂലം കൂടുതൽ ഫലങ്ങൾ ഉല്പാദിപ്പിക്കുകയും ചെയ്യുന്നു. ഒരു വൃക്ഷത്തിന് സാധാരണയായി മൂന്നോ നാലോ റാത്തൽ അമ്മോണിയം സൾഫേററ് മതിയാകുന്നതാണ്. ഈ അമ്മോണിയം സൾഫേററിനോടുകൂടി നാലോ അഞ്ചോ റാത്തൽ Super Phosphate-ഉം, ഏകദേശം 100 റാത്തൽ ചാണകവും കൂട്ടിച്ചേക്കാം. ഇപ്രകാരം കലത്തപ്പെട്ട വളം ചുവട്ടിൽ വിതറുകയോ ഏകദേശം ഒരടി ആഴത്തിൽ തെങ്ങിനു ചുററും കുഴിയെടുത്തു് അതിൽ ഇട്ടു മൂടുകയോ ചെയ്യാം. ഇതോടുകൂടി 25 റാത്തൽ ചാരവുംകൂടി ചേക്കുന്നപക്ഷം അതു് ഏററവും ഉത്തമമായിരിക്കും. ഇങ്ങനെ നിമ്മിക്കപ്പെട്ട വളം തെങ്ങിന് ഏററവും അനുയോജ്യമായതും, അതിശയകരമായ ഫലത്തെ പ്രദാനം ചെയ്യുന്നതും ആണ്.

വൃത്താന്തസംഗ്രഹം.

ഇൻഡ്യക്കുള്ള വളത്തിൻെറ ആവശ്യകത

കാർഷികകാര്യവകുപ്പാൽ തയാറാക്കപ്പെട്ട ഒരു കണക്കിൻപ്രകാരം പ്രതിവർഷം കാർഷിക ആവശ്യങ്ങൾക്കുവേണ്ടി ഇൻഡ്യയ്ക്കു് ഏകദേശം 1500,000 ടൺ Nitrogen അവശ്യം ആവശ്യമാണെന്നു് കാണുന്നു. ഇതിനു പകരമായി ചാണകം, പിണ്ണാക്കു് മുതലായ സാധനങ്ങളിൽനിന്നും ഇൻഡ്യക്കു് ഇന്നു ലഭിക്കുന്നതു് 500,000 ton മാത്രമാണു്. ഇങ്ങനെ പ്രതിവർഷം 1000,000 ton Nitrogen വീതം ഇൻഡ്യക്കു് പോരാതെ വരുന്നു. ഈ കുറവിനെ പരിഹരിക്കാൻ കൃത്രിമവളനിർമ്മാണത്തെ അഭിവൃദ്ധിപ്പെടുത്തുകയാണു് കരണീയമായിട്ടുള്ളതു്. ഇൻഡ്യാഗവൺമെൻറിൻെറ വകയായി സിന്ദ്രിയിൽ ഉണ്ടാക്കാൻ പോകുന്ന വളനിർമ്മാണശാലയുടെ പണി പൂർത്തിയാക്കി അതു പ്രവർത്തനക്ഷമമാക്കുന്നതിനു് ഇനിയും കുറച്ചുകാലം കൂടി വേണ്ടിയിരിക്കുന്നതിനാൽ, ഇൻഡ്യക്കു് അനുപേക്ഷണീയമായിരിക്കുന്ന വളത്തിൻെറ ഗണ്യമായ ഈ കുറവു്, ഇതര രാജ്യങ്ങളിൽനിന്നുമുള്ള ഇറക്കുമതികൊണ്ടു് പരിഹരിക്കേണ്ടിയിരിക്കുന്നുവെന്നു് കാർഷികകാര്യവകുപ്പിൽനിന്നും ചൂണ്ടിക്കാണിച്ചിരിക്കുന്നു. എന്നാൽ, Nitrogen ഉൾപ്പെട്ടിട്ടുള്ള വളങ്ങൾ എല്ലാം തന്നെ "International Emergency Food Council"-ൻെറ അധികാരപരിധിയിലാണെന്നു് ഇവിടെ പ്രത്യേകം ചൂണ്ടിക്കാണിക്കേണ്ടിയിരിക്കുന്നു.

ഈ വർഷത്തിൽ ഇൻഡ്യക്കു് ആവശ്യമായിട്ടുള്ളതു് 800,00 ton അമ്മോണിയം സൾഫേററാണു്. എന്നാൽ ഏകദേശം 100,000 ton-ൽ കൂടുതൽ ഇൻഡ്യക്കു ലഭിക്കുവാൻ യാതൊരു മാർഗ്ഗവും കാണുന്നില്ല. നാട്ടിലുള്ള അസംസ്കൃതസാധനങ്ങളിൽനിന്നും മേൽ പറയപ്പെട്ട കുറവിനെ പരിഹരിക്കുന്നതിലേക്കായി, Nitrogen സംഭരിക്കുവാനുള്ള പരിശ്രമം ഇൻഡ്യൻ വ്യവസായികൾ നടത്തുന്നുണ്ടു്. ആണ്ടിൽ 5,00,000 ton അമ്മോണിയം സൾഫേററു് നിർമ്മിക്കുന്നതിലേക്കായുള്ള ഒരു ഫാക്ടറി ഫെർട്ടിലൈസേഴ്സ് ആൻറ് കെമിക്കൽസ് എന്ന നാമധേയത്തിൽ തിരുവിതാംകൂറിൽ തുടങ്ങുകയും അതു് ഇപ്പോൾ മേൽപറയപ്പെട്ട അമ്മോണിയം സൾഫേററുണ്ടാക്കിത്തുടങ്ങുകയും ചെയ്തിരിക്കുന്നതു് നമുക്കു് ഏററവും ചാരിതാർത്ഥ്യജനകമാണു്. Super-phosphate മുതലായ മററു വളങ്ങളും അവിടെത്തന്നെ നിർമ്മിക്കുന്നതിലേക്കുള്ള നടപടികൾ ത്വരിതഗതിയിൽ നടന്നുവരുന്നുണ്ടു്. ഇതിനു് ആവശ്യമായ എല്ലുകൾ സംഭരിക്കുന്നതിലേക്കാണു് ഏററവും വിഷമം നേരിട്ടിരിക്കുന്നതു്. എല്ലുകൾ ഈ നാട്ടിൽനിന്നും ധാരാളമായി കയററുമതി ചെയ്യുന്നതുകൊണ്ടു് അതു ലഭിക്കുവാൻ വലിയ ബുദ്ധിമുട്ടു നേരിടുകയും, അഥവാ ലഭിക്കുമെങ്കിൽതന്നെ അതിൻെറ വില വളരെ കൂടുതൽ ആയിരിക്കുകയും ചെയ്യുന്നതുകൊണ്ടു് Super-phosphate നിർമ്മാണംതന്നെ ഇൻഡ്യൻ വ്യവസായികൾ വളരെ കുറക്കുവാൻ മാർഗ്ഗമുണ്ടു്.

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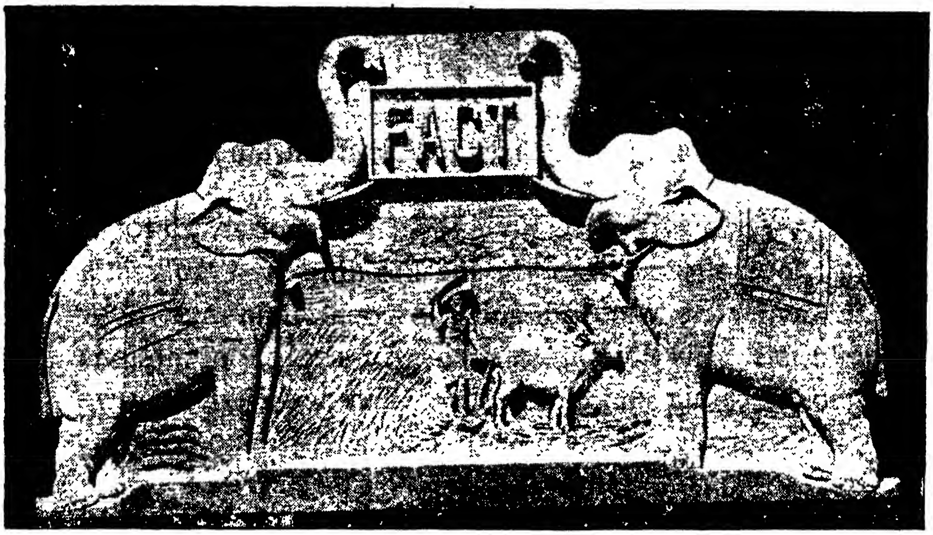
MAHATMA GANDHI

— THE LIGHT OF ASIA —



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EDITORIAL

OUR HUMBLE HOMAGE

ON Friday the 30th of January 1948, a cruel hand switched off the Light and silenced the voice of our beloved leader, Mahatma Gandhi, the Father of the Nation and beloved of his people, Apostle of Nonviolence, Saint and Prophet of Peace, great soldier of freedom and lover above all of the lowly-humble and the oppressed, plunging the whole world into a gloom from the effects of which it will not be easy to recover. That the dastardly hand of an assassin should have brought to a close a life dedicated to the service of India and the humanity, particularly at a moment when the Living Light of those ideals of love and tolerance were needed most, is indeed a calmity of the highest

magnitude. And the greatest man of our times has left us to join the realm of the greatest martyrs of humanity, from Jesus Christ to Abraham Lincoln.

History records no leader, no teacher, no founder of religion who, in his life-time had so vast a following or wielded such personal influence over millions. His devout followers by scores of millions flocked to his standard while he lived. Well, may we say, "Here was a man; when comes such another."

Dominated by a sense of eternal values based on Love, Truth and Non-violence he has been, as aptly expressed by Professor Albert Einstein, "a leader unsupported by outward authority; a politician whose success rests not upon craft or mastery of technical devices, but simply on the convincing power of his Personality; a victorious fighter who has always scorned the use of force; a man of wisdom and humility armed with resolve and inflexible consistency who has devoted all his strength to the uplifting of his people and the betterment of their lot; a man who has confronted the brutality of Europe with the dignity of the simple human being and thus at all times risen superior. Generations to come, it may be, will scarce believe, that such a one as this ever in flesh and blood walked upon this earth."

Mahatmaji lived, fought and died for the noblest of causes. Love was his creed, Truth his banner, the unconquerable Spirit his sword, and Non-violence his shield. All that was earthly and mortal of Gandhiji has perished. But the spiritual and immortal qualities of his soul, his life and teachings, these cannot perish.

As Pandit Jawaharlal Nehru, in his inimitable language put it, "though the light of our lives seems to have gone, it is not an ordinary light and it will shine for a thousand years and console a million hearts" and centuries hence people would look back to this generation for the rare privilege it had of treading the earth with this man of God.

May God Almighty grant us the fortitude, and the strength to carry on His Mission of Peace and Good-will on earth.

Editorial Board.

From the moment the radio choked repeatedly on the evening of the 30th of January to give out the terrible news of the death of Mahatma Gandhi, a creeping anguish spread on every face in FACT. The employees of F. A. C. T. assembled at 10 A. M. the next day in front of the Senior Dormitory to pay their homage to Gandhiji. A condolence resolution moved by the President of the Employees Association was passed. All present stood in silence for two minutes and took a pledge to dedicate themselves to Truth and the noble cause for which Mahatmaji lived and died. At 4 P. M. the employees assembled once again, marched solemnly to the banks of the Periyar river, and offered their prayers to the departed Soul of Mahatmaji.

Editor.

FERTILIZER WORKS
OF THE
TENNESSE VALLEY AUTHORITY

By M. C. VERGHESE, B. A., A. I. I. S. T., S. M. (M. I. T.) (CHEM. ENGG.) A. I. Ch. E.
OF THE F. A. C. T. LTD.

OUT of the three main elements of plant food, nitrogen, phosphorus and potassium, the Tennesse Valley Authority (T. V. A) in U. S. A. manufactures nitrogen and phosphorus in the forms of ammonium nitrate and superphosphates. The T. V. A. fertilizer works are situated at Muscel Shoals on the banks of the Tennesse River in the State of Alabama. The situation is ideal as regards raw materials, power, transportation and consuming areas. Electrical energy is obtained from T. V. A's Wilson Dam power plant whereas phosphate rock, coke etc., from nearby areas. The policy of T. V. A. to improve the soils in the Tennesse Valley by supplying fertilizers manufactured in the heart of the region has been well carried out.

In 1933, when the T. V. A. was set up by an Act of the United States' Congress, it acquired from the War Department two ammonium nitrate plants built between 1914 and 1918 for the purpose of manufacturing explosives. These plants used the calcium carbide ⟶ calcium cyanamide process to fixnitrogen.

In 1942, under an agreement with the War Department T. V. A. put up a modern ammonia synthesis plant at a cost of 10 million dollars to produce 160-200 tons of anhydrous ammonia a day. The ammonia was converted into ammonium nitrate for explosive purposes for the army. A new calcium carbide plant was also built to produce 300 tons of the material per day. This was sold to Dupont and other Corporations for making synthetic rubber through the acetylene route. The old phosphate furnaces were used to produce yellow phosphorus for incendiary bombs.

As soon as the war was over T. V. A. turned over these defence works for the production of fertilizers. At present the production is well over 500 tons of conditioned ammonium nitrate a day as well as about 200 tons of phosphates.

The ammonia synthesis plant of the T. V. A. is in most ways similar to the plant at Alwaye. The differences in construction mainly are that all high pressure piping at T. V. A. is of welded construction and that the synthesis converter is of laminated steel make.

In the operations of T. V. A. gas is made from coke as semi-water gas in Koppers generators. The nitrogen and hydrogen are in the mixed form from the start till it is fed to the synthesis converter in contrast to F. A. C. T's method of producing

pure nitrogen and hydrogen and then combining them. T. V. A. converts the carbon monoxide in the semi-water gas to carbon dioxide by oxidising it with steam by the help of an iron catalyst. The hydrogen produced by the breaking up of steam is proportioned with the nitrogen in the semi-water gas to get the correct ratio of nitrogen to hydrogen. The carbon dioxide is removed by scrubbing with water at 200 atmospheres pressure in contrast to the chemical mono-ethanolamine method used by F. A. C. T.

Essentially the process for making ammonium nitrate is as follows:— The anhydrous ammonia is vaporised and mixed with purified air. The mixture contains 9—10 per cent of ammonia. This is preheated after which catalytic oxidation of nitrogen to nitric oxide takes place at 1350°F. A waste heat boiler and another oxidising unit follow to convert the nitric oxide to nitrogen peroxide. A battery of countercurrent absorbers at atmospheric pressure helps in the absorption in water of the nitrogen peroxide producing a 50% nitric acid. The acid is then neutralised in batch tanks with ammonia vapour to form ammonium nitrate. The hydrogen-ion concentration control at this point is important. The weak ammonium nitrate liquor is then evaporated in open pans and then crystallized. Temperature control in these stages is essential to prevent fire and explosive hazards. Finally the material is cooled, sieved and coated with a P-R-P mixture (paraffin – rosin - petronatum) to prevent moisture absorption and shipped out in paper bags.

The above process only requires ammonia and air for the production of a nitrogenous fertilizer. T. V. A. is putting up a modern pressure absorption system to produce 60% nitric acid as well as install modern units for the evaporation and crystallization processes a proposal to pipe in natural gas for the production of ammonia instead of using coke is contemplated.

The phosphate plant at T. V. A. uses phosphate rock mined from adjacent districts containing 26-40% phosphorus pentoxide. Coke, silica, lime and electricity are readily available.

The products are:—

1) Super phosphate
2) Triple - Super phosphate
3) Triple - Calcium and di-ammonium phosphates
4) Phosphoric acid

Phosphate rock mixed with clay is passed through nodulizing kilns at 2000°F to get the correct texture. Silica and coke are then added in needed proportions and the mixture is charged into electric furnaces. Phosphorus gas comes out of the top when the correct temperature is reached and molten slag is tapped out of the bottom. The gas is condensed to produce yellow phosphorus or oxidised with air to phosphorus pentoxide and by absorption in water, phosphoric acid is obtained. Phosphoric acid is

used to produce any of the phosphatic manures required by mixing it in correct quantities either with crushed phosphatic rock or other materials.

T. V. A. also operates a fused tri-calcium phosphate plant which material can either be used as a fertilizer or as animal feed. This is a very economical process of producing phosphatic manures and is the culmination of the T. V. A. efforts in this direction. Fuel fired shaft type furnaces are used to charge rock phosphate directly with the addition of silica. Fluorine is liberated from the rock, thereby making the P_2O_5 available for plant consumption. Upto 120 tons per day is being produced.

The policy of T. V. A. in fixing fertilizer prices as well as its distribution is unique. Prices allow only a very narrow margin to the Authority as profit and distribution is done through farmers' Co-operatives. Thus the fertilizer elements reach the farmer at low prices. T. V. A. also maintains experimental farms and soil research organizations to advise and demonstrate to the farmers. Ammonium nitrate is being sold at about 48 dollars per 2000 pounds at present.

T. V. A. is bent on developing a new balanced fertilizer like di-ammonium phosphate containing two elements in one. The present tendency is towards more and more of cheap phosphatic manures as it is the most effective element in soil building. T. V A. will contribute a large proportion of America's contemplated 10 million tons of phosphatic manures a year.

It is a matter of great pride to see that F. A. C. T. is thinking in the same direction as T. V. A. does. For a superphosphate plant is coming up fast in F. A. C. T. which will augment and balance our ammonium sulphate production. Thus India and especially South India will be fortunate in having a project producing both the important plant foods.

Churchillian Courtesy.

A conceited young play-wright sent two tickets for the first night of his new revue to Mr. Churchill. Enclosed with the tickets was a note saying: "One of the tickets is for you, and the other for a friend, if you have one".

Mr. Churchill courteously replied that he was very sorry he would be unable to be present on the first night, but would try to attend the second - if there was one.

Einstein's Relativity in limerick.

"There was a young lady called Bright,
Who could travel much faster than Light,
She went out one day,
In a Relative way,
And came back the previous Night".

TUNING FOR FULL PRODUCTION

By N. N. SIMHA B. E., A. M. I. E.,
(Asst. Superintendent, Eng. Dept.)

IT is an accomplished fact that chemical industries have come to play an important part in industrialisation. It is not an exaggeration to say that the whole group of other vital industries are continuously indebted to one or the other of the common things produced by the chemical manufacturer. If this truth is accepted it is not difficult to understand the importance of the requirements of maximum possible production of the existing chemical plants.

Consider for example, the case of 'FACT'. It is necessary for this plant to produce as much as possible in order to supply the ever needed fertiliser to the agriculturists in these days of continuous food shortage. Supply of chemicals such as Ammonia and Sulphuric acid goes a long way in helping the manufacture of several other essential products. It is not an easy problem to tune a plant of this type to full production within a limited period of time. Gigantic industrial enterprises of FACT category have their own inherent troublesome problems which are more complex and hard to segregate and define. Smooth and effective attainment of the objective of an organisation of this type requires the co-ordination of all activities performed in building the organisation.

The very foundations of our modern industrial plants stand on the three legs of a tripod - viz., erection, operation and maintenance. Each one of these three factors react on each other in very close and intimate fashion. In the following paragraphs, it is intended to consider the effect of each of these factors on the other in general.

DESIGN & ERECTION:

Poor design and erection are a source of continuous worry for successful operation and maintenance. The poor design might involve under estimate of the required capacity of the equipment or selection of an equipment not wholly suited for the purpose. Also improper layout will necessitate undue efforts in operation. The designer should consider these aspects in addition to the personal element involved in the operators of the plant. Examples of poor erection are weak foundations causing heavy vibrations, wrong alignments, poorly welded, rivetted or bolted joints, improper settings, etc. All these or any one of these factors may be responsible in lowering the productive capacity of the plants of continuous process manufacture. The design should be as far as possible of automatic operation type and should be simple enough not involving very high skill in operation or maintenance.

OPERATION:

Successful operation forms the second important factor. Before

the plant is put into production, it is necessary that each unit should be tested individually under full load conditions if possible. This preliminary test of the capacity of each equipment helps considerably in tuning the plant to full production. It may be said that this test forms part of the erection programme rather than operation.

Efficient and continuous operation assumes utmost importance when once the plant is placed on production. The proper working of each equipment, however small it is, will be essential to keep the continuity of the process involved. Personal element of the operator has also an important bearing on good operation. Smartness, presence of mind and understanding of situations are required in the operators handling modern equipments of a very complicated nature. Poor operations such as working an unit under continuous overload conditions or with insufficient lubrication, etc., should be scrupulously avoided.

INSPECTION:

Systematic inspection of all machinery and equipment is necessary to detect defects that might cause the breakdown of the machinery or failure of the equipment. This important function of inspection should be conducted as an independent function if it is to be successful in eliminating future troubles. Practical methods of inspection rest on the existence of easily applied standards, such as the temperature of the running machinery, or the insulation resistance of an electrical equipment, etc. A number of causes conspire to make the equipment fail and these causes have to be investigated and rectified by vigilent inspections.

MAINTENANCE:

While it is essential that proper operation should hold a high position among factors that contribute to production, the problems involved in the maintenance of a plant consisting of various types of equipment assumes equal importance. One of the greatest problems that worries the Engineers and Chemists as well is how to maintain the equipment in running condition. Maintenance or lack of it is a large factor which decides whether or not any certain capacity of a plant can remain constant. Machinery needs attention periodically or it may quickly lose some or all of its productive possibilities. Proper maintenance is therefore essential to the continuous, smooth and efficient operation of any plant Plant capacity tends to be reduced gradually by the ever present factor of wear and tear. But good maintenance can retard the rate of wear and tear.

It may be helpful to review and summarize a few important item to be remembered in carrying out maintenance work. The reader is reminded that these are common standard practices which are quite often ignored, or overlooked.

1) Make periodic inspection to detect defective equipment and

carry out emergency repairs where possible.

2) Make repairs or replacements as shown by inspection reports.

3) Suggest changes in design of machinery and equipment to eliminate excessive wear and reduce the frequency and number of repairs.

4) Keep on hand, readily accessible, a sufficient stock of materials, replacement parts and tools to take care of emergency repairs and routine maintenance work.

5) Use proper tools.

6) Instruct and educate the men on duty on the use of the right type of tools to be used and the proper procedure to be adopted in handling the particular job.

7. Adopt all safety measures before, after and during the period of work to prevent accidents to the men and machines.

8) Co-ordinate the work of maintenance with operation staff to eliminate improper understanding and inordinate delay in completing the work.

9. Maintain equipment History Records which will give useful information on all the repair and maintenance work done on each equipment.

CONCLUSION:

It may be observed that every one of the above considerations contribute to the factors that affect the tuning for full production. Without any commitment it may be generalised that the relative contribution of each of these factors in not attaining full production are:—

1)	Poor design & Erection	20%
2)	Poor operation	35%
3)	Poor inspection & Maintenance	45%

Vipers in the Air!

During World War II many important personages, for reasons of military secrecy, had to travel under assumed names. Air passenger lists shielded their movements with the names of "Dicks and Harrys". When such annonymity tended to defeat itself in the matter of expediting a particularly important mission, the initials of V. I. P. meaning "Very Important Personage" was added to the assumed name. And such travellers have come to be designated as "Vipers"!!

RECLAMATION OF ALKALINE SOILS

By Using Gypsum (Calcium Sulphate - $CaSO_4$)

By

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Soil Alkalinity and its causes:

Alkaline Soils are met with in various parts of the Madras Presidency and also in Travancore State. For example, the soils of Nanjanad are found to be definitely alkaline in reaction, as they contain large amounts of NaCl, Na_2CO_3, Na_2SO_4, etc., dissolved in soil water. A soil whose pH (Hydrogen ion concentration) is above 7 is said to be alkaline. Highly alkaline soils may have a 'pH' of 9.5, 10 or even upto 11- though such excessive alkalinity is rarely met with.

Soil alkalinity is due to the presence of large amounts of soluble salts, such as, Na_2CO_3, Na_2SO_4, NaCl, KCl, salts of Magnesium etc., in soil-solution and to the adsorption of strong bases like sodium in the Colloidal Complex. The main causes for such salt-accumulation are: 1) The soils may be situated over extinct saline lake or ocean area. 2) Soils that have poor drainage facilities may develop high salinity owing to the excessive evaporation resulting in the salts dissolved in soil water being retained there gradually. (3) It may be due to the use of irrigation water containing a high percentage of salts dissolved in it. (4) In places where the water table is very near the surface, the ground water, if rich in salts, will rise up by capillarity during periods of drought and consequent high rate of evaporation and thus the top soil may become impregnated with alkaline salts.

Generally alkaline soils are more to be found in regions of low rainfall.

Evil Effects of Alkalinity:

1) Among the salts found in alkaline soils Sodium Carbonate (Na_2CO_3) is the most injurious, as it readily hydrolyses and produces NaOH, a strong alkali which attacks organic matter. It has a corrosive action on plants and hence definitely injurious to crops. (2) Again, the presence of a large amount of soluble salts in soil-solution will naturally interfere with osmotic absorption of water and nutrients by plant roots. The crop will consequently be faced with nutritional difficulties and it will not be able to resist any drought. (3) Other plant nutrients such as iron, manganese, phosphoric acid, etc., will become nonavailable to plants under such conditions of alkalinity. (4) The colloidal fraction of the soil will be saturated with sodium, which will at once result in the deflocculation of clay and the soil will be in a puddled, slimy

condition. (5) The impermeability of the soil will be increased and adequate drainage will become nearly impossible. The plant roots also might find it difficult to penetrate downwards. (6) There won't be proper aeration inside the soil-body, which will lead to anaerolic conditions, under which many toxic compounds may be liberated.

In short an alkaline soil, owing to the varied causes enumerated above, will be of very low fertility and poor health.

Correction of Alkalinity:

There are many instances of alkaline soils being simply abandoned as quite unfit for farming. But soils of even very high alkalinity can be brought back to normal health by adopting suitable chemical treatment. In this connection gypsum (calcium sulphate) plays an important role. It has been used on a large scale in countries like U. S. A. and its use has met with marked success.* When gypsum is applied to the soil all the sodium adsorbed in the colloidal complex will be replaced by calcium and the injurious sodium carbonate will be converted to neutral Sodium Sulphate.

Along with this chemical treatment certain other operations also have to be performed, if we are to reclaim the alkaline soil within a reasonably short period. The following are a few of the most important and necessary operations to be carried out:—

The salts dissolved in the soil-water have to be washed out of the soil and in order to do this frequent applications of irrigation water are necessary. The water will leach out all the excess accumulations of salt. But in this connection it must be remembered that effective leaching will not take place unless there are good and ample drainage facilities. Hence the drainage problem has to be attended to first prior to taking up irrigation. It will be better if the land is levelled so that water enters it uniformly.

In addition to applying gypsum, the alkaline soils need a heavy application of organic matter, such as green leaf. This has always been found to have a marked beneficial effect and will hasten in bringing normal health to the soil. To achieve this a system of green manuring can be adopted. Crops like daincha, or sunhemp can be grown on the soil itself and then ploughed under, when fully grown. During the rotting of this organic material a lot of carbon-di-oxide will be given out which will convert chalk into calcium bi-carbonate—the latter will help in the granulation of colloidal fraction of the soil.

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*NOTE: Powdered Sulphur has also been used to reclaim alkaline soils. The sulphur is oxidised by soil bacteria to sulphur try-oxide which produces sulphuric acid with water. This acid converts the injurious sodium carbonate into neutral and comparatively harmless sodium sulphate. The application of sulphur must of course, be accompanied by application of chalk or gypsum to supply exchangeable calcium.

The alkaline soil should never be allowed to dry up, lest the ground water impregnated with salts will rise up by the force of capillarity and will leave the salts in the top soil.

Thus the watch words in the reclamation of alkaline soils are:– Application of gypsum ample drainage- leaching by irrigation water- green manuring.

Dosage:—

Of course the proper dose of gypsum to be applied is directly proportional to the degree of alkalinity in the soil. Normally about 2 to 3 tons of gypsum will suffice per an acre of soil. Highly alkaline soils will demand much heavier doses. The gypsum to be applied must be in a pulverised condition and care must be taken to see that it is spread uniformly over the field.

EFFICIENCY ENGINEERING

BY

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THE past three decades have witnessed remarkable developments in science and technology and the methods of production in industry have undergone revolutionary changes with greater emphasis on machinery in place of human labour. While science and technology have kept pace with the demands of various industries for newer and better machines which would reduce labour, decrease costs, increase production and thus bring about a general lowering of prices resulting in an improvement in the standard of living, it was obvious to the discerning few that there was no such corresponding development in industrial management and organisation.

After the 1914-18 war, it came to be realised that the capitalist structure of society which was in vogue then had either to reform or perish. Particularly in Germany, a good deal of thought was devoted to this immense and immediate problem and the idea of Rationalisation gradually evolved itself. It was only as late as 1927 that clear-cut ideas of Rationalisation were laid out in the Economic Conference held at Geneva. Rationalisation consists in understanding and applying every means of improving the general economic situation through technical and systematic organisation. These include the scientific organisation of labour, standardisation of both materials and products, simplification of processes and improvements in the systems of marketing and transport. Also it laid stress on the importance of the application of the results of psychology and psychiatry in the selection of workers, scientific methods of wage payment, cost accounting, scientific marketing and a statistical study of business conditions. In short, rationalisation is a method of technique and of organisation designed to secure the minimum waste of either effort or material.

While the principles of rationalisation are applicable to an industry as a whole, considerable amount of research was also carried out, to discover similar principles which would result in increased and efficient production in the various individual factories constituting a particular industry, Such names as F. W. Taylor, Gant, and Gilbreth are household names in this field and the principles of management formulated by these men are worth serious study. They realised the need for an entirely new subject "Efficiency Engineering".

"Scientific Management", the name given by Taylor to his system

of organisation, "involves the establishment of a control which directs the researches, establishes and maintains the standards, makes the plans and controls the coordinated efforts for the consummation of the plans". Simply put, it is opposed to the rule-of-thumb methods in production and believes in a standardisation of methods and the organisation of a planning department in every factory. In the time-honoured methods of management there is a good deal of scope for mental laziness on the part of managers with resultant stagnation. The managers or foremen leave it to the workers to evolve a pattern for a particular work and just criticise them when mistakes occur. Scientific management offers vehement opposition to this method and insists that the managers must originate, plan and arrange the work of the factory and select the proper men for a job. Only if planning preceeds the work of every labourer, the whole working day will be productive and there will be less scope for waste. Gang bosses and foremen should be entirely relieved of the work of planning which can be tackled only by the planning department. It is the duty of the planning department, which is the brains-trust of the factory, to collect, analyse and classify all data relating to the processes of manufacture and make it available to the workers. Also, all the necessary drawings, appliances, tools and materials must be made available to the workers by the planning department.

Next in importance to the planning department, Taylor recognised the need for Functional Foremen, instead of the conventional departmental foremen. For efficient operation, each man, from the Assistant Superintendent down, should have as few functions as possible to perform. There are many functions common to all departments of a factory. Under functional foremanship one foreman supervises a certain aspect of the work moving from section to section. Thus any job can be analysed into its constituents and it is the duty of the functional foreman to check this function in each section. Thus there may be one foreman designated "Order-of-work clerk" who regulates the sequence of work, an "Instruction-card clerk" who supplies instructions and directions to all sections, a "Time and Cost clerk" in charge of issuing job cards for costing purposes, and a "Shop Disciplinarian". There may be a few "bosses" to assist these foremen. A "gang-boss" is a kind of seargent who regiments the workers till the work is commenced; a "speed-boss" who checks shiftlessness and slackening of pace; an "Inspector" to check the quality of work and a "repair-boss" to attend to plant maintenance. The organisation of the maintenance department of F. A. C. T. is in effect an application of Taylor's principles. Instead of employing a few riggers, mechanics and fitters in every plant of a factory, all the available men and talent is pooled and made available to every plant

whenever required. This ensures the economic utilisation of the best available talent all the time and at every place.

Another important aspect of scientific Management is Time and Motion-study. Time-study aims at finding out the exact amount of time required to complete a certain operation. Every job is divided into its constituent elements and each item is timed separately. Then by adding these unit times and allowing for rest pauses the standard time for a certain job is fixed. Time-study thus helps in preventing "Ca-canny methods" or people taking things easy. It also helps in the fixation of wages under the piece-rate plan.

Gilbreth, a brick-layer by profession, introduced the concept of Motion study. According to him "there is no art or trade that can't have its output doubled by application of the principles of Motion-study'." Motion-study consists in investigating the necessary movements for every task and the elimination of the unnecessary or awkward ones so that fatigue is reduced and the work is accelerated. Stress must also be laid on the correct sequence of movements. Gilbreth believes in prescribing a standard and scientific method of doing a job by correcting the idiosyncrasies of the individual and moulding his habits to conform to the standard pattern.

The foregoing, is but only a brief narrataion of some of the forces that have been at work in industry tending towards increased production by a scientific approach to the entire problem of industrial management. A word of caution should also be sounded before conclusion, in that while a judicious and co-ordinated application of the principles of scientific management will do immense good to any factory, they should not be applied wholesale or without the expert guidance of "Efficiency Engineers". They should be gradually introduced with suitable modifications to suit the needs of the individual.

Well may we ponder after going through this article as to how far our Indian factories are scientifically managed!

Getting Mixed up!

Long ago an Australian Ambassador in London trying to be very civil to a lady of importance expressed regret that he had "cock-roached" upon her time. The lady gently corrected him saying that he should have used the words "encroached upon her time".

The Ambassador explained: "I am sorry, madam, but I get English genders mixed up at times. I shouldn't have said "cock-roached" in regard to a lady. I correct myself "hen-croached".

SELF SUFFICIENCY IN FOOD

A rational approach to the Problem

By

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THE experience of the past five years and, especially the last two, have convincingly shown that we continue to be short of food. But for the foreign imports and the fairly efficient internal distribution, the tragedy which overtook Bengal in 1943 would have extended to the rest of India. The low productive capacity of the soil, combined with the steady increase in population are the major causes and these cannot be easily remedied. Any increase in production from land will be outstripped by the proportionately greater increase in population, which will soon reach the five hundred million mark. The recent policy of decontrol and the steady abolition of the rationing system will certainly eliminate some of the abuses which are well known. At the same time, it will lead to a greater measure of unequal distribution and wastage which the rationing system helped to keep under some control. If there is any unexpected failure of crops,* it will be very difficult to prevent another famine.

The object of this contribution is not so much to dilate on the above well worn theme, but to approach the problem from an entirely different angle. If some practical success can be achieved in the new direction, we can reasonably expect freedom from acute shortage for a few decades, if not more.

EVOLUTION OF THE PRESENT SYSTEM OF FOOD-STATUS OF FOOD GRAINS.

It is not clear as to how the present systems of food actually came to be evolved, but there is frequent reference in earlier literature to the use of vegetables, tubers, fruits and dried leaves from select vegetation, especially by ascetics and scholars. The country was mostly covered by forests and there was practically no cultivation. Clearing of the land, cultivation operations and production of grain crops were later developments. Because they were dry, concentrated foods could be easily stored and used in a variety of ways, grains became increasingly popular, with the result that, to-day, they form between 60 and 80 per cent of the food of the majority of the people. During the passage of centuries, we have learnt several methods of

* At the time of writing, it has been announced, both on the Radio and by the Press that owing to the failure of the North East Monsoon, the rice crop in the East Coast has suffered badly and that South India and Madras, in particular, will require a big allotment from outside sources to tide over the difficulties of the spring months of 1948.

processing and otherwise using grains with the result that to-day we would feel lost, and even starve, if our grain supply is cut off. If only we can orient our outlook and find ways of replacing at least a part of our grain requirement by other forms of food materials, our position would be far happier than it is at the present time.

Reduced to simple units, our food materials, consist of carbohydrate (mainly starch), protein, fat, minerals and vitamins. Starch forms over 60% of our food and is mainly derived from grains. The protein is derived from pulses, meat, fish, milk and eggs. The fat is derived from butter, ghee, oils and, to a smaller extent, from other sources. Minerals and vitamins are normally present in the above food materials, as also in vegetables and fruits, which generally form parts of our food.

CEREALS CAN BE LARGELY REPLACED BY TUBERS.

Judging from available information, Travancore was in a relatively worse position in regard to cereals than Bengal was in 1943. It is nevertheless a fact that there was practically no case of starvation in Travancore, while between three and five million people died and several millions more were permanently wrecked in health through the famine in Bengal. The saving factor in the case of Travancore was the extended production and use of tapioca, which, though a poorer article of food than the cereals, is nevertheless sustaining. Tapioca is a heavy yielder and, under favourable conditions, about ten tons per acre or more may be expected. The importance of tapioca has already been realized and the Famine Enquiry Commission has laid stress on the extended production of tapioca, sweet potato, potato and other tuber crops which can yield more starch per acre than cereals.

Over a large part of the country, tubers cannot altogether replace cereals as food materials. They would nevertheless make up for shortage. The excellent example of Travancore should be followed up and people should be encouraged to produce more tubers. The State should also facilitate the transport of tubers from one part of the country to another. Dehydration of tubers would be expensive, though in times of emergency, even this will have to be done. A more efficient system will be to store the tubers at low temperatures above the freezing point when they will keep as such for the best part of the year.

LEAF CROPS ARE RICH AND ABUNDANT FOOD MATERIALS.

We use several leaf crops as vegetables, but we do not use them in bulk. Tender shoots of many plants make excellent food materials, and when grown intensely, they can provide more bulk food than even tubers. Leafy foods especially those of leguminous origin are rich in proteins besides minerals and vitamins. They contain growth promoting factors, the value of which is

being steadily realized, especially in America.

Attention has already been drawn to the inferiority of tubers especially of tapioca to cereals as sources of balanced food. The leaf crops, on the other hand, are much richer than cereals and can serve as supplements to cereal diets even at low levels. In a recent experiment, Mr. B. K. Sur in Bangalore found that the growth of experimental animals on poor South Indian rice diet was more than doubled when 10% of the rice was replaced by tender lucerne in dried form. *These observations are of practical significance and would show that apart from its bulk value, even half an ounce per head of such processed materials per day will make up for most of the deficiencies in the poor rice diet.*

The South Indian rice diet is perhaps the poorest diet consumed by any race of people in the World. The diet has undoubtedly the merit of being easily digestible and therefore suited to tropical conditions. At the same time, it is a very poor diet, deficient in proteins, minerals (especially calcium) and vitamins, so much so that, with these limiting factors, growth is retarded and the consumers are subject to multiple deficiency diseases. The majority of the South Indian population cannot afford the necessary quantities of milk, butter, eggs, meat, fish etc, which are concentrated sources of food accessories. A considerable section of the people are also religiously and sentimentally opposed to eating meat, fish and eggs in any form. To these and to the other millions, who are tied down by economic considerations, it will be a great blessing if cheap and concentrated food supplements of purely vegetable origin can be made plentifully available. Apart from partially meeting our shortage in bulk, such a supplement will promote better growth, especially in the young, and make us generally healthier and stronger.

It may have been intuition or even instinct on the part of our ancestors when they made dried leaves from select vegetation, as part of their diet. They lived very long and healthy lives. The present trend of scientific evidence would not only point to the profound practical wisdom of the ancients, but also reveal such an approach as a simple and efficacious method of dealing with the problem of gross deficiencies in our diet.

ANIMAL AND VEGETABLE MILKS·

It has been amply demonstrated by several workers, both in this country and abroad, that liberal quantities of cow, goat and buffalo milk will make up amply for the deficiencies in the poor cereal or tuber diet. About twenty ounces of milk per head, per day, would provide useful supplement of protein, fat, vitamins and minerals. The quantities, thus provided, are not large, but they meet many of the gross deficiencies in the diet and thus facilitate growth and well-being. Milk is, perhaps, the richest natural

source of calcium (about 100 mg. in 100 c. c.) and is of special value as a supplement to the poor rice diet. Unfortunately, the supply of milk, especially in South India, is very limited and the average consumption is hardly two ounces per day. Milk is not a rationed article, so, while a small section get twenty ounces or more, a great majority (including the vulnerable age groups) get practically no milk. Every attempt is being made by the State to increase the milk supply, but the main limiting factor is the supply of fodder and concentrates. With the increasing pressure on land from the growing population, it is doubtful whether even the present low average can be maintained in the years to come.

The recent researches conducted at the Indian Institue of Science, combined with field studies with thousands of human subjects (mostly children under 15), have shown that soya-bean milk which can be easily prepared either in the home or in a factory has a high supplementary food value which is only slightly inferior to that of good dairy cow's milk. During the past two years, soya curd and rice fed to thousands of school children as mid-day meal has shown itself in taste, flavour and nutritive value to be as good as separated milk curd and rice. The children receiving this diet have shown distinct improvement in health as compared with those who go home for their mid-day meals. Over a hundred children (infants and toddlers) who received soya milk in the Municipal Welfare Centres for about 18 months have responded quite as well to soya milk as to whole cow's milk. The infants, in particular, have responded somewhat better to soya milk than to cow's milk. Still more rigorous experiments carried out with about four hundred children in orphanages have shown that soya milk has more than 80% of the supplementary value of dairy milk. The last series of studies, which were carried out in collaboration with the Nutrition Research Laboratories, Coonoor and the All-India Institute of Hygiene, Calcutta have convincingly demonstrated the high supplementary value of soya milk, especially to growing children whose health is of the utmost importance to the country. With such evidence before us, there can be no further doubt regarding the potential value of vegetable milks, especially to the poorer sections, who constitute more than 90% of the population of the country.

Soya-bean can be grown under a variety of soil and climatic conditions. It is a short duration crop, most of the varieties coming to harvest in about three months. Till the crop is established in a certain area, the yield of beans may be 500-800 lbs. per acre, but under favourable conditions, 1500–2000 lbs. may be expected. The bean is richer than the ordinary pulses and contains 35–40% protein and 15–20% oil. The plant material makes good fodder and being a legume, the plant also enriches the soil. One pound of bean (costing 2-3 annas) will make 6 lbs. of milk and it should not be difficult to market the milk

at about one anna per pound. The processing details have been fully worked out and with adequate State support, combined with some voluntary co-operation, it should soon be possible to popularise the use of the milk.

Soya-bean is now being grown only to a small extent in the country. With the convincing evidence now before us, the State authorities should unhesitatingly encourage the increased production of the bean for making milk. The bean does not make a good *dhal* and as the *dhal* is also difficult to digest, the consumers should be encouraged to use the bean chiefly for making milk.

We have a number of other oil-seeds in the country, but none of them is naturally so well suited for making milk as the soya-bean. Thus, groundnut milk is less stable, less palatable and has a poorer nutritive value than soya milk. Soya is our best source, and, pending the discovery of any other equally good or better raw material, we should encourage its extended production and use for the preparation of milk. The use of soya milk will not, in any way, interfere with the programme for the increased production of cow and buffalo milks for which there will always be demand. The animal milk will, however, be in short supply and the vegetable milk, which can be produced more plentifully and cheaply, will come very useful as a supplement, especially for the poorer sections of people.

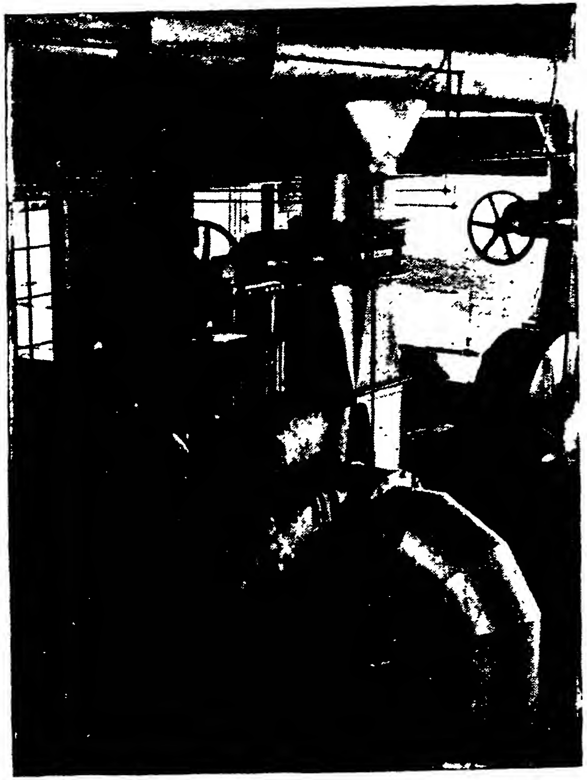
FOOD YEAST.

During the recent War, there was acute shortage of concentrated protein foods. This led to the development of Food Yeast production in Europe, West Indies and America. India was also considered a rich potential source because of the large quantities of molasses which are still not adequately utilised. Owing to want of proper equipment, Indian production was comparatively small. Most of the yeast produced in the country was converted into pre-digested concentrates of the Marmite type.

Food Yeast is undoubtedly a rich source of protein, the average specimen containing 40–50% of that constituent. It is not such a rich source of B-group vitamins as the Brewery yeast, but these supplements can now be easily provided. Experimental animals respond very well to even small (1—2) percentages of food yeast, but the results with human subjects have not been satisfactory. Experiments carried out by Ahmad and others in India have shown that children do not like repeated doses of food yeast and that the growth response is almost neglible. In some cases there was even loss of weight. This is largely traceable to the poor digestibility of the food yeast. The biological value of the protein is also low, being of the order of 30.

Predigested (autolysed) yeast preparations are easily assimilated but the average Indian user does

A VIEW OF OUR POWER SUB-STATION.



A VIEW OF THE HYDROGEN GAS GENERATOR TOPS IN THE FIRST FLOOR. HYDROGEN GAS SECTION.

A VIEW OF THE PRODUCER GAS BOOSTER IN THE MACHINERY ROOMS. PRODUCER GAS SECTION.

not like such preparations because of the characteristic flavour and the intense saline taste due to the salt which gets included during the processing. Moreover, such preparations which are obtained after expensive processing are rather costly. The future of Food Yeast would seem to depend on the development of improved methods of processing the yeast as such.

A microscopic examination of the average specimen of Food Yeast would show that the cells are mostly intact. Even strong cooking does not break up the majority of the cells. If some simple method of disintegrating the cells can be evolved and the resulting product made more digestible, there would then be greater scope for using the product. Some work in this direction is already in progress in the Biochemical laboratories of the Indian Institute of Science.

There is no doubt about the potential value of Food Yeast. The Government has already decided to set up one factory (Capacity, about 3000 tons per annum) near Hardwar. More of such factories can also be easily set up. It is hoped that beforelong, the processing methods, as also the use of yeast for different food preparations, will be fully standardised.

EDIBLE SEED CAKES.

Another rich source of concentrated food is the edible seed-cake. The most abundant among these is the groundnut cake which contains about 50% protein besides fair quantities of Vitamin B, and Nicotinic acid (about 35 mg. in 100 grams). The cake makes a good supplement to the wheat diet, but has not proved a good supplement to the rice diet. It is nevertheless a good source of protein, and enzyme predigested products comparable with marmite have been prepared out of it by Giri and Kuppuswamy at Bangalore. Workers in different provinces in India have investigated the possibility of using the cake as such or as admixed with wheat flour. The experience has been rather varied, Punjab reporting that even small quantities affect the quality (the taste and flavour) of bread and *Chappati*, while Bombay found that even up to 25% can be safely admixed without any adverse effect. The Nutrition Advisory Committee of the Indian Research Fund Association recommended that, in view of its good food value, the fullest possible use of the cake should be made. The need for using cake of good quality has been emphasised.

Groundnut cake as now produced in India contains varying amounts of oil. This oil turns rancid on standing Except in some factories, the cake is not well stored and many of the specimens on the market are not only moist, but also show evidence of fungus growth. The cake as bought on the market generally includes the coloured skin, some shell material, earth and even sand. The powdered cake is coarse and often gritty. Such a cake can be

safely fed as a concentrate to animals, but it will require some processing before it can be used as human food. Some scientific data are required to show the extent to which the different constituents of the groundnut cake are actually used in the human body.

Cakes from sesamum, cocoanut, cotton-seed and other edible seeds can also be used, but, as things stand, they cannot be used in more than small quantities. Through centuries of eating comparatively soft and easily digestible foods, the human system is not readily adapted to coarse and gritty foods however nutritious they may be. Man's need always comes first, but we also need animals for milch, draught and other purposes and they will go short if we are to draw on the comparatively limited supplies of seed-cakes. Moreover, the quantities of cakes produced in the country are not so large as to meet the enormous needs of the fast-growing population. In any case, the cakes will have to be rendered clean and processed by some suitable pre-treatment before they can be considered to be suitable for human consumption.

FISH AND FISH PRODUCTS.

India has a large coast line and enormous quantities of fish can be obtained if there is properly organised deep sea fishing. The Government is keenly interested in developing fishing on a big scale, but shortage of suitable fishing vessels, inadequacy of storage facilities and poor development of fish processing industries stand in the way of rapid extension. We are still dependent on the small collections made by fishermen. If, as we hope, this line is properly developed, there will be plenty of good and cheap fish which will go a long way towards meeting the needs of a large section of people, especially in the coastal areas. The properly stored fish can also be sent, in large quantities, into the interior. Fish provides protein, minerals and vitamins and would thus make an excellent supplement to the poor cereal diet.

Fish can be processed in a variety of ways and dozens of new food industries can be developed if abundant supply is avilable. Thanks to the excellent opportunity provided by the last War, Shark-liver oil industry has now been re-started and quite large quantities of oil with high vitamin A potency are now available. Quick and improved methods of extraction, specially suited to out-lying places, are still needed. A large part of the oil now produced in the country has an unpleasant odour and taste. It should be possible to mask or modify the odour and, at the same time, stabilise the vitamin. A more elegant procedure will be to prepare odourless concentrates. It is hoped that the plans for the expansion and the stabilisation of the industry which are now before the Government will soon be given effect to.

MEAT AND EGGS.

In a rich and prosperous country with plentiful supply of fodder and concentrates, these nutritious and

concentrated forms of food will rank higher than grains and vegetables. In a densely peopled country like India, grains take the first place as the chief food of the masses. With the increasing pressure on land for the production of human food, there will be diminishing scope for animal food. Apart from giving milk and meat, animals play a very important part in agricultural production and *our future planning should definitely aim at producing more from land so that there will be enough food for both man and animals.* Human feeding is however our first concern and all our efforts should first be directed towards production of more bulk food suitable for human consumption from land.

FERTILISER THE MOST IMPORTANT ACCESSORY FOR INCREASED FOOD PRODUCTION.

Better methods of cultivation and improved varieties are undoubtedly very important, but the plant cannot grow and produce unless it has sufficient basic food material in the soil. Most of our soils are highly deficient in nitrogen and phosphorous, and, unless these are made up, our yields from land will continue to remain at a very low level. The most important fertilising ingredient is nitrogen and a very useful and concentrated source of this is ammonium sulphate. Mysore took the lead in producing this important fertiliser, but the production is still quite small. Fortunately, the Fertilisers and Chemicals of Travancore with a much higher capacity, has now come into production. It is hoped that, before long, a large part of South India will be served by this important industry. South India is looking up to F.A.C.T. as its source of additional food supply and it is earnestly hoped that 1948 will see production at full capacity and that the benefit will be seen in the spring crops of 1949.

The country is now producing increasing quantities of phosphatic fertilisers. A number of small factories for the processing of bone have sprung up in different parts of the country. Super-phosphate is still the most important fertiliser for grain crops and it is hoped that a large part of the surplus acid produced by the F. A. C. T. will be utilised for the production of this important fertiliser.

With adequate supplies of ammonium sulphate and phosphatic fertiliser, we can look forward to an average increase of at least 25% in food production. With extended use of fertilisers, even larger increase can be expected.

SPREAD OF KNOWLEDGE AND IMPORTANCE OF DEMONSTRATIONS

Developments in Food and Agriculture are of very great interest and importance to the public and the related knowledge should be spread in the widest possible manner. The F. A. C. T. magazine is doing a very valuable service in this direction. The Agricultural Departments are

conducting demonstrations and doing useful propaganda and they will no doubt do more when larger quantities of fertilisers are available.

We need badly however another type of propaganda in spreading the already available knowledge in regard to alternative food materials. People should be not only told about the value of tubers, leaf crops and vegetable milks as auxiliary and supplementary foods, but there should also be a fairly effective organization for popularising them. There should be demonstrations and people should be taught different attractive methods of using them. New schools of cookery and dietetics should be set up and original work in evolving new methods of food preparation and simple household processing should be encouraged. The knowledge and experience thus gained should be carried to the homes in an effective manner. In this very important service, not only charitable organizations like the Red Cross and the Mission Societies, but also leading Women's Societies can play a very useful part. Food is our first concern and there is no better service than producing and popularising the use of various food materials.

First Come, Not First Served.

The nurse beckoned to one of the group of expectant fathers at the hospital and announced; "you have a fine son."

Immediately another man rushed up and complained, "what's the idea? I was here before he was!".

Machinery & Safe Practices

(By P. B. Menon, Safety Engineer)

i) Do not attempt to start or operate switches, valves, controls or machinery with which you are not familiar. Do not tamper with any equipment not concerned with your job.

ii) Do not remove any covering or guard without the Foreman's permission. If you must do so, replace and fasten it before machine is placed into operation Remember you are responsible that guards around equipment are in place.

iii) Do not use machinery, tools, or materials which are not in proper conditions for safety. Have them repaired. Unsafe tools are dangerous to yourself and your fellow workers.

iv) Do not make any repairs on any machines, while it is in motion. First shut down the motor, then place a safety card on the switch with proper safety lock. It is also a good idea to tell your partner what you are doing. The safety tag will show the date and name of the person doing the work. If some other employee's tag and lock are already on the switch, enquire from the foreman. Do not start any machine that is protected by a sign and or lock. If the machine is not undergoing repairs, call the foreman who will find out who locked the switch and why. When repairs have been completed and the machine signed over, the foreman may start the machine. Responsibility of starting a machine protected by a lock or card is on the Foreman See him.

v) If it is necessary to do work in a location where there is any possibility of being injured by moving crane or any other machinery (regardless of the type or size) then all precautions must be taken to protect the workmen. Interview the foreman of the Plant or the Plant Supdt. for beginning work, so that he can size up the situation. The switch furnishing electric power to the crane must be thrown up to the "OFF" position, before commencing the work. If it is possible tie up the crane and then the area in which the work is to be performed must be safeguarded by means of stop blocks fastened to the crane rails or by other positive appropriate means. Place the red flag by day and red light by night which are visible to the crane operator as well as for others.

vi) Do not climb over the guards to reach a motor or any other machine. If there is no other way, report it, and provision will be made.

vii) Hammers, chisels, punches, flatteners, hardics, fallers, drills and tools shall not be used if they have burrs or mush-room heads.

viii) Before placing work in or on machines and when leaving machine for any length of time, the power should be shut "OFF"

ix) Do not try to place belt on a moving pulley.

x) Do not attempt to stop a moving pulley; wait until it stops rotating, even though it may take longer to do so than you think is necessary.

xi) Do not clean the surface of any pulley or flywheel while it is in motion.

xii) Be very careful when oiling a motor that is not running; some one might start the motor, not knowing you were there. This has happened. Make sure that the switch is out or the operators know what you are doing. The same applies when oiling a crane.

xiii) Do not leave tools or loose materials overhead from where it may fall and injure some one.

xiv) Be careful in using a handle extension or a hammer on a wrench. The wrench or connection may easily be strained or broken by this method.

xv) A crane shall be operated only by regular crane operators, authorised substitutes or crane repair men.

xvi) The crane operators must lift load only high enough to clear safety obstacles upon the floor. When loads are to be carried over a long distance to a high position, they should be carried as above until final occasion is reached, then lifted to the desired height.

xvii) Do not allow more than one man at a time to pull on the hand chain of a chain block. Be sure that the block is securely fastened to the member, which is to carry the load, also be sure that the member and supporting structure will carry the load.

xviii) Care should be taken when using chains in order to avoid straining them or causing accidents by breakage. Do not kink or twist a chain and a load nor carry it over sharp edges. Do not lift the load on the point of a hook, nor force a chain or hook into a place by hammering, nor insert the point of the hook into a link. Report any defect in chains etc. immediately.

Question Box

In this section answers are given by our Soil and Fertiliser Expert to Questions received from the Public on soil, agriculture and use of Fertilisers)

Question No. 1.

What is the correct method of applying Ammonium Sulphate to flower beds ?

Answer:

The proper dose of Ammonium Sulphate for flower beds is ½ to ¾ oz. per square yard. With a view to facilitate uniform distribution, the fertiliser can be diluted with 4 to 6 times of sand or soil. The total quantity of the fertiliser may be conveniently split in several small heaps, that will be adequate for the different beds and then they can be scattered over the top soil and an immediate irrigation given. Strong fertilisers like Ammonium Sulphate need not be applied to *very young* seedlings that have not yet taken firm hold of the ground. The application of the fertiliser may be renewed every fortnight or even a week, depending upon the growing phase of the plants. It must be remembered that the plants need more of nutrients just prior to and during the flowering stage. Ammonium Sulphate will at once inject health and vigorous growth into the plants. If possible, in conjunction with Ammonium Sulphate superphosphate (dose not less than that of Ammonium Sulphate) may also be applied.

Question No. 2.

Can we apply Ammonium Sulphate to Crotons and if so, what is the dose you recommend ?

Answer:

The normal dose of Ammonium Sulphate may be taken as ¼ to ½ oz. per plant. The fertiliser (straight or diluted) can be scattered thinly over the soil, a few inches from the stem and then covered with soil and a copious watering given. The optimum dose directly depends upon the size of the plant. The crotons do not need so frequent doses of the fertiliser as the flowering plants; the former are slow growing by nature. It will be adequate if the fertiliser application is renewed once in 3 weeks or so. The application of Ammonium Sulphate will be immediately followed by the appearance of fresh and thick foliage.

Question No. 3.

What is the proper dosage of Ammonium Sulphate for plants grown for their fruits ?

Answer:

a) For small shrubs, such as Tomato, Bringal, Bendai, Chillies, etc., the normal dose may be taken as 1 to 2 oz per sq. yard of the garden. The method of application is nearly the same as for the flowering plants. When the plants have attained full size the fertiliser can also be applied around each plant and then raked into the soil. It must never be forgotten that the application of

Ammonium Sulphate should immediately be followed by a copious watering

Along with Ammonium Sulphate, Superphosphate and Potassium Sulphate or Chloride can also be applied, in which case we will have an allround, complete fertiliser-mixture.

b) In the case of fruit trees, the dose may vary from 1 to 3 lbs. per tree, depending upon its size and variety. The fertiliser is to be applied in a round trench dug around the tree just at the beginning or during the rains. If on the other hand the fertiliser is applied broadcast over the soil, then it is better to work it into the topsoil by digging or ploughing. Large trees like mango may require heavier doses. In applying fertiliser to trees, the important point to be remembered is not to apply it very near the tree stem, but away from it for the absorbing root-ends are situate some distance away from the tree. The fertiliser must always be applied during the rains and not during summer, when the moisture-content of the soil will be very low indeed.

Question No. 4.

Can you advise me as regards the application of Ammonium Sulphate to Juari (Cholam) grown on black soils ?

Answer:

The black soils are chiefly confined to Ceded Districts, Coimbatore, Salem, Tinnevelly and Ramnad Districts. These soils are generally deep, rich in lime (which is normally to be met with in the form of nodules, known as, "Kankar nodules") and they have high moisture-retentive power. Because of their high clay content they have the power to retain the plant foods supplied by the fertilisers. As these soils are ideal for cotton cultivation, they are also spoken of as 'black cotton soils'.

The standard dose of Ammonium Sulphate to be applied to these soils is 2 cwts. per acre; this dose will suffice under ordinary conditions. In addition 1 cwt. of Superphosphate may also be applied. Ammonium Sulphate not only increases the yield of the present crop, but shall also show substantial residual effect on the cotton crop that may follow Juari; experiments conducted by Madras Agricultural Department have conclusively proved this fact. The fertiliser (Ammonium Sulphate straight or as mixed with super) may be broadcast over the field and ploughed under, prior to the sowing of the crop or it can also be top-dressed later, 3 or 4 weeks after sowing.

NEWS & NOTES .... in brief

STEPPING UP FOOD PRODUCTION IN TRAVANCORE.

Prompt measures have been taken by the Travancore Government for stepping up the production of food crops, which include:—

1. Increasing the area under food crops by bringing all available fallow lands in the State under cultivation.
2. Providing irrigation and other facilities in order that double cropping annually is introduced in all areas where only one crop was taken till now.
3. Providing manures, fertilisers, implements etc., at concessional prices with a view to intensify production and increase per acre yield.
4. Encouraging production of alternate food crops such as vegetables, fruits etc., by free supply of seeds, subsidies, bonuses for digging wells etc.
5. Leasing out virgin and fertile lands in the forests for cultivation to individual cultivators or to co-operative societies or other corporate bodies.

A Press Note issued recently by the Government in this connection states that swamps situated in the interior forests covering small extents of less than 10 acres will be leased, that the extent of land allotted to one individual will be not more than 5 acres and the lease in each case will be for a maximum period of four years.

I. C. M. A. ANNUAL MEETING.

FACTS showing the gap between productive capacity and actual requirements.

The urgent need to develop the chemical manufacturing industry to such strides as has been made in industries like textiles, sugar, cement and jute was stressed by the Minister for Industries and Supplies of the Madras Government while inaugurating the eighth annual general meeting of the Indian Chemical Manufacturers' Association on the 29th of November, 1947. The Hon'ble Minister rightly pointed out the supreme importance of the chemical industry in our national economy.

Dr. K. A. Hammeed, delivering his presidential address referred to the value of the chemical fertilisers, especially mixed fertilisers in this country for intensifying the agricultural production. India needed 4 to 5 million tons of fertilisers annually. The present production of ammonium sulphate amounted to only 76,000 tons of which Travancore produced 50,000 tons, Mysore 6,000 tons, and Coke Ovens 20,000 tons. The immediate needs of super-phosphates was estimated to be 700,000 tons, mainly for pur-

poses of conversion into mixed fertilisers with ammonium sulphate. Double the capacity of our sulphuric acid plants (present output 1,10,000 tons) is needed to produce the requisite quantity of super-phosphate. There was thus a 'tremendous gap' between the present productive capacity and actual requirement of fertilisers.

Dr. Hammeed deprecated the 'virtual monopoly' enjoyed by certain firms in regard to the import of caustic soda and urged the establishment of large units for the manufacture of this chemical. He emphasized that establishment of only large scale units will allow production to be undertaken on more economic basis. In doing so, it may be observed that he has echoed the views expressed by Dr. K. P. P. Menon at the Press Conference held in F. A. C. T. on 1-11-47 explaining the reason for the design of an ammonium sulphate plant of 50,000 tons capacity at Alwaye. The instructive facts given by Dr. Hammeed regarding the gap existing between the requirements and the productive capacity in essential industries, are tabulated below side by side with the estimated contribution by the Fertilisers & Chemicals, Travancore Ltd., Alwaye.

Name of the product.	Actual requmts.	Productive capacity.	Gap.	Estimated contribution by FACT.
	Per year	Per year	Per year	Per year
1. Ammonium Sulphate (fertiliser)	50,00,000	76,000	49,24,000	50,000
2. Super-phosphate (fertiliser)	7,00,000	1,00,000	6,00,000	*60,000
3. Sulphuric acid	1,60,000	1,10,000	50,000	□6205
4. Soda Ash	1,00,000	55,000	45,000	....
5. Caustic Soda	50,000	10,000	40,000	7,000

*Plants in the construction stage.

□ In addition to quantity used up for Ammonium Sulphate production.

PROGRESS OF SINDHRI FERTILISER PROJECT.

The Government have concluded agreements with the Chemical Construction Corporation of the U. S. A. for the design of the factory and with the Power Gas Corporation of the U. K. for procuring plant and erection of the same The necessary technicians for the erection of the factory are beginning to arrive. Orders for important items of plant have been placed in the U. S. A., the U. K. and India. A considerable tonnage of plant has arrived at the site, or is in transit. Ammonium Sulphate is intended to be manufactured for the present to an estimated capacity of 3,50,000 tons per annum. Full production of the plant is expected to commence by the end of 1950. The suppliers of the plant are obliged by agreement to train

Indian Nationals in the operation of similar plant and machinery for which purpose they may be sent to the U. K. or U. S. A. according to sources of supply.

The requirements of gypsum for the factory is expected to be of the order of .6 to .7 million tons a year. The Ministry of Industry & Supply is appointing a Mining Engineer to report on the availability of gypsum for this factory.

Comparisons have been drawn between the Sindhri Project and the factory at Alwaye, Travancore. The former is designed to produce 3,50,000 tons of ammonium sulphate per year, while the latter can produce 50,000 tons. While the Sindhri Factory is to produce solely by the gypsum process, the Travancore Factory provides also for the sulphuric acid process. Again, while wood is used in the Travancore Factory for maknig synthesis gas, at Sindhri it will be manufactured from Coke. It is proposed to instal Coke Ovens at Sindhri for the coking of second grade coal. While this proposal has the advantage that the Coke Oven gas obtained can be used for firing the kiln of the cement factory to be operated on the calcium carbonate sludge by-product, it is interesting to recall the words of Dr. Rajendra Prasad during his visit to the Alwaye factory, on the economic utilisation of raw materials in general. "I know we have large stock of coal but the way in which we are indulging in our industries, it is expected that our present coal will not last for more than 50 years or so. That is the basis of present calculations. If our consumption increases, the superior quality of coal will last even less. It is therefore a great thing for taking to firewood instead of superior coal for this factory".

GROWING MORE COCOANUTS.

Some interesting statistics about this important agricultural product have been disclosed at the last meeting of the Indian Central Cocoanut Committee at Bombay. It has been estimated that out of the total production of 3,361 million nuts in the Indian Dominion, the share of Madras, Travancore, Mysore and Cochin comes to 94% of the total output (Madras, 44%, Travancore, 36%, Mysore, 10% and Cochin, 4%). India also produces 1,05,000 tons of cocoanut oil. Compared to this India's consumption of Cocoanut Oil is 1,58,000 tons, the deficit being made up by imports of oil from Phillipines and Ceylon. The available quantity of Cocoanut oil, according to the official bulletin, is consumed by soap industry (36,000 tons), toilet and toilet articles (47,000 tons) and used for edible purposes (70,000 tons). The scope for expansion of this industry which needs larger supplies of the oil, pleads at once for a strong case for growing more cocoanuts in India itself. This can be achieved in a large measure by the application of the proper dosage of fertilisers like ammonium sulphate and super-phosphate. Normally 3 to 4 lbs. of Ammonium sulphate mixed with 4, to 5 lbs. of super-phosphate and 100 lbs. of cattle manure for a single

tree will be adequate for ensuring maximum yield.

THE DAMODAR SCHEME.

The Damodar Scheme is to be accorded the highest priority of construction by the Central Government. The two provinces, Bihar and Bengal to be mainly benefitted by the scheme have already scheduled to seek legislative approval to set up the Damodar Valley Corporation. The Irrigation Minister of the Bihar Government while moving the official resolution, disclosed that there would be as many as eight dams–all in Bihar. The benefit of the scheme would extend to 9,000 sq. miles and to 50 lakhs of people. About three lakhs K. W. of electricity would be generated by the hydro and thermo methods. Bihar would benefit chiefly out of cheap power generated and a solution will also be provided for the province's problem of soil erosion. Bengal would be able to bring about nine lakhs acres of land under the plough.

PEECHI RESERVOIR SCHEME IN COCHIN STATE.

A dam is to be located on the river Manali at Peechi about 15 miles from Trichur. The capacity of the reservoir covering a water spread of 2.65 sq. miles is to be 2,000 million cubic feet. The maximum height and maximum width of the dam will be 106 feet and 95 feet respectively. The canal system taking off from both flanks of the dam will irrigate an area of 12,000 acres of new lands, 6,000 acres of single crop to be converted to double crop and 8000 acres of existing double crop. The dam is estimated to increase the production of paddy by about 22,000 tons per annum.

LAND NOT TO LIE FALLOW IN COCHIN STATE.

The Maharaja of Cochin has issued a proclamation ordering that those who leave uncultivated lands on which paddy crop used to be raised, cause it to be reduced by using a portion of it for other purpose or utilise it in any way that will reduce the normal yield of paddy, will be punished with a fine not exceeding Rs. 1000/ and to a further fine of Rs. 50/- for each succeeding days. The proclamation is highly commendable and it is hoped that the public will fully rise up to the occasion to increase the food production of the State to the maximum extent possible.

FACTS THAT INTEREST

ANHYDROUS AMMONIA AS FERTILISER.

"The American Fertiliser" reports that a new farm practice is being followed in Mississippi, Arkansas and Louisiana by using Anhydrous Ammonia as fertiliser. Already 150,000 acres of crops in these areas are reported to have been fertilized with this new inorganic manure. Shortage of other forms of nitrogenous fertilisers stimulated the acceptance of this fertiliser. And having a nitrogen content of 82.3%, its effectiveness in increasing the yields has generally proved a bit more than ammonium nitrate.

The first problem that confronted the station men in the use of the fertiliser was the application of this gaseous substance to the soil. Anhydrous Ammonia (Ammonia without water) under ordinary conditions is a gas and under high pressure is a liquid. A high pressure tank was fitted, for this purpose, on a tractor and equipped with necessary safety valves A tube was run down to the ground and into the ground just back of a knife-like device.' The latter cuts a path for the tube to follow. With the valve open the liquid escapes into the tube. With the pressure released the liquid turns into gas. The tube feeds the gas into the soil to a depth of six inches. A disc hiller right on its heels covers before the gas can escape.

Ammonia when properly applied goes into solution in the soil water from which it combines with the clay. It then comes off the clay particles fast enough to supply crops with nitrogen.

It is estimated that the cost of production of Anhydrous Ammonia will be comparatively much less than ammonium nitrate or other fertilisers.

The problems connected with its use and distribution as a fertiliser are being worked out and it is whispered that Anhydrous Ammonia has a very bright future.

SOIL-LESS CULTIVATION.

Speaking on hydroponics (the science of soil-less cultivation), at the Royal Asiatic Society of Bengal, Calcutta, Mr. S. Douglas claimed that this method of cultivation could solve India's food problem.

He stressed the need for taking advantage of the science in big cities as part of the "grow more food campaign." Excellent crops, he said, could be grown on roofs, terraces, verandahs, etc. by this method. "We have had an average of 140 tons of tomatoes per acre in hydroponics at Kalimpong, against five to ten tons of soil." In England the Carnation growers were now using this method in preference to soil.

Engaged by the West Bengal Government, Mr. Douglas is carrying on research in hydroponics at the Government Experimental Farm, Kalimpong.

IRRIGATION BY ARTIFICIAL RAIN.

Man has to no more depend blindly on Nature if what his latest weapon to fight famine "irrigation by artificial rain", assumes full possibilities. Practical tests in Australia have proved that with two inches of artificial rain, the output of holding has been doubled.

The system is quite simple and easy of adoption. Water is forced through holes in a pipeline or sprayed from a rotating nozzle into the atmosphere and it descends in the form of rain. By infecting compressed air into the water supply, a spray of fine mist can be obtained which also simultaneously makes avaliable oxygenated water. An ample supply of water is thus highy essential and this can be best maintained by electrically-run water pumps. Careful planning of layout by qualified engineers is absolutely necessary to avoid waste of electric power and unnecessary piping. The main points of superiority of rain-making over the usual method of flooding the fields are:- economy of water; accurate control of amounts; obstacles of cantour are overcome; less labour when once the plant is installed.

TAMING THE CHEMICAL DEVIL.

A "chemical devil" is being tamed by American scientists and house-broken to help industry. Fluorine, the "bad man" of the chemicals has become manageable, capable of mass production, and that prospect has set-off hundreds of chemists on a search for new uses for this chemical.

Fluorine is a gas, colourless, heavier than water and so active that even at a temperature barely above absolute zero it explodes upon contact with liquid hydrogen. Wood will spontaneously burst into flame, steel, wool burn brightly, glass, asbestos and rock disappear in smoke when brought into contact with fluorine.

Industry has used fluorine in the past in the production of aluminum, gasoline and ceramics, as an insecticide, and as refrigeration gas which, however, were only a small part of fluorine's known potentialities.

The problem was to devise methods of mass production and for safe handling and transport. The electrolytic method of producing fluorine from a melt of potassium fluoride and hydrogen fluoride has been found most satisfactory. Today the gas, over 99 per cent pure, is shipped in steel cylinders containing ½ pound under 400 pounds pressure.

Now fluorine, the chemical devil of past years, has become a chemical angel. Scientists who have been working on fluorine's potentialities, foresee a series of new uses. A fluorine lubricating oil, so rugged, it will not deteriorate under the most trying mechanical operation, will lead to engines of a type impossible today. The lubricant will take pressure and friction far beyond the capacity of today's oils. As a perfect insulator, fluorine gas will be used in X-ray and modern electronic techniques.

Fluorine compounds such as the metal fluoroborates protect wood against insects, remove iron stains in laundries, speed metal-planting and welding processes

The most paradoxical property of fluorine is its capacity of entirely forgetting its devilish activity and combining instead into compounds of practically indestructible stability. Hydro-carbons, with all the hydrogen replaced by fluorine, result in the most stable of these combinations, the fluorocarbons. Appearing as gases, fluids or solids, they refuse to react with common chemical structure. They make ideal fire-proofing materials, special coatings against rust, wood-protecting coatings and special-duty paints. A commercial fluorine plastic, Teflon, resists attacks of all materials with the sole exception of molten alkali metals.

TOWARDS BETTER TEETH.

The addition of fluorine to drinking water can probably reduce dental decay by 60 per cent. This appears from tests conducted in seven United States cities during the past two years.

For example, in a city of 30,000 population dangerous counts of lacto-bacillus acidophilus in the saliva of children under eight was reduced by fluorine from 63.5 to 47.3 per cent. In a neighbouring city of equal size without fluorine in its water no change in the percentage of children affected by tooth decay could be observed. These tests showed that apparently one part fluorine in 1,000,000 parts water is the best mixture.

NEW FIRST-AID DEVICE

Claimed to be equally suitable for use in surgery, dentistry and child-birth a new anaesthetic called "Trilene" has been discovered. It cannot render one unconscious and is, therefore, suitable for use by unskilled people in mines, ambulances, factories and first-aid parties.

It is a development of the war-time use of "Trilene" soaked in a wooll-plug in an ordinary benzedrine nasal inhaler which induced satisfactory, though short, analgesia.

In a demonstration of the new apparatus a man used it for about a minute and then felt no pain when a needle was stuck in his leg. As with other machines for self-administration, the "Trilene" inhaler does not work in every case. Tests in 1,183 cases showed good analgesia in 85 per cent of the cases fair in 9 per cent, and in 6 per cent failure to develop at all.

FACT NEWS..................in brief

(FROM WELFARE TO FAREWELL)

WELFARE

Sports

TUG OF WAR.

It is with great pride and pleasure that we extend our warmest congratulations to the F. A. C. T. Tug of War Team that came out victorious in the Inter-Factories Tug of War Tournament conducted by the Athletic Association of the Indian Aluminium Company and won for F. A. C. T. the Rolling Cup for the second year in succession In this connection, it may be mentioned that the Indian Aluminium Company in a healthy competitive spirit mustered a strong staff team for the event. But the F. A. C. T. team proved too good and won the finals in two straight pulls. Well may the F. A. C. T. Team complete the 'Hat trick' in 1948, and remove the "Roll" from the "Rolling Cup."

The Members of the victorious team.

V. S DeBeausset.
C. F. Mackey.
V. S. Pillay.
M. G George.
P. G Menon.
L. H. Padua.
T. S Ramakrishnan.
K. Bhashyam.
K. Ramavarmah.
P. K Krishnankutty Menon.
S. R. Seshan.
S. B. Iyer.

The first nine participated in the finals.

TABLE TENNIS.

It is indeed gratifying to note that our Recreation Club is maintaining a very high standard of game in Table Tennis And we congratulate our A. Ramakrishna Iyer, who won the Singles Title in the Non-Medallists' Singles Championship in the tournament conducted recently by the South Indian Table Tennis Association at Madras.

F. A. C. T. Co-operative Society, Ltd., No 2700

The F. A. C. T. Co-operative Society Ltd, No 2700 was registered under Act V of 1112 on the 13th of August, 1947, with a authorised share capital of Rs. 50,000/- made up of 5,000 shares of Rs. 10/- each. The following facts unmistakably point out the popularity and the usefulness of the Society in meeting the needs of the employees.

Total Number of members as on 31—12—'47 529

Number of shares subscribed 1,701

Amount of sales for the month of December, 1947 (approx.)

a) of Rationed articles Rs. 3,935/-
b) of Consumers' goods 5,954/-

Total sales during Dec. 1947. 9,889/-

The F A. C. T. Employees Association.

The inaugural meeting of the F. A. C. T. Employees Association came off on the 20th of January, 1948 under the Presidentship of Sri. Pattom A. Thanu Pillay, the President of the Travancore State Congress. Mr. P. N. Menon, the President of the Association in welcoming the guests pointed out that the Association had no idea of linking up with any political party and that it believed in settling up disputes-if any arose-by peaceful negotiations with the Management, without the aid of any outside agency. Sri. Pattom Thanu Pillay, in his inaugural address complimented the Asso-

ciation for its laudable objects and expressed his desire to see that the Association continued to maintain the same cordial relationship with the Management. Sri. Ekkanda Warrier, the President of the Cochin State Prajamandal and Sri. M. N. Sivaraman Nair who also addressed the meeting, commended the F A C. T. Employees Association for the new and welcome orientation it had given to the Trade Union movement in the matter of its formation and in the method for the achievement of its objects; and wished the Association all success.

Wedding

The marriage of Mr. Varkey Koshey with Mary Chacko took place on 22nd January 1948, at the Marthoma Syrian Church, Chengannur.

We offer our hearty felicitations to the new couple.

F. A. C. T. Colony Quarters.

The extent of the progress so far made in providing accomodation to employees can be gathered from the following:-

(a) Family Quarters.

NAME	Number	No. of families accomodated
1. Sr. Family Quarters.	9	9
2. "A" Type Quarters.	2+3*	2
3. "C" Type Quarters.	24+4*	24
4. Ir Dormitory Quarters.	17	16
5. Other Quarters	7	7
Total No. of Families accomodated		58

* Nearing completion.

(b) Bachelor's Quarters

NAME	No. of Rooms	No. of Employees accomodated
1. Sr. Dormitory.	30	73
2. Bachelor's Quarters (Ex-Convent Building)	21	86
3 Temporary Shed	4	16
Total No. of Employees accomodated in Bachelor's Quarters.		175

FAREWELL

We miss from our midst Messrs. P. Kandell (Assistant Superintendent, Sulphate Plant), C. P. Durham (Assistant Plant Superintendent) and C. F. Mackey, (Superintendent, Sulphate Plant) who, after successful completion of their work, have proceeded back to U. S. A. Besides putting us in the way, Mr. Mackey and Mr. Kandell, have as members of our Tug of war team shown us how to pull well-alone and together-and led us to victory in the Inter-Factories tug of war tournament. We wish them god-speed.

We also miss Mr. K. S. S. Menon, the office manager, who was with us almost from the inception of the factory. He has left us to better his prospects. We wish him all success in his endeavours.

ബാപ്പുജി

(By ബാലകൃഷ്ണൻ)

ആ വിശ്വദീപം പൊലിഞ്ഞു. നമ്മുടെ ബാപ്പുജി—വാത്സല്യനിധിയായ ബാപ്പുജി—നമ്മോട് അന്ത്യയാത്ര പറഞ്ഞു. തോരാത്ത കണ്ണുനീരിൽ, തീരാത്ത സന്താപത്തിൽ നമ്മെ ഉപേക്ഷിച്ചിട്ട് നമ്മുടെ ബാപ്പുജി യാത്രപറഞ്ഞു.

സർവ്വ സമുദായങ്ങളുടേയും ആദർശദീപമായിരുന്ന-സർവ്വ മത തത്വങ്ങളുടേയും സാരാംശമായിരുന്ന-ഭാരത സന്താനങ്ങളുടെ ഉത്തമ സഹോദരനായിരുന്ന —പിതാവായിരുന്ന—പിതാമഹനായിരുന്ന— അല്ല, സർവ്വസ്വവുമായിരുന്ന ആ കനകദീപം പൊലിഞ്ഞു. അതെ, എന്നെന്നേക്കുമായി നമ്മിൽനിന്നും അപഹൃതമായി.

അമ്മെ! ഭാരതാംബികെ! നൂററാണ്ടുകളായി അസ്വസ്ഥമായിരുന്നു അമ്മയുടെ ഹൃദയം. നൂററാണ്ടുകളായി പാരതന്ത്ര്യത്തിന്റെ ലോഹവലയങ്ങളിൽ പെട്ടു ഞെരുങ്ങുകയായിരുന്നു അമ്മയുടെ ജീവിതം. ഇന്നലെവരെ അഭിപ്രായ സ്വാതന്ത്ര്യമൊ, ആശയസ്വാതന്ത്ര്യമൊ അമ്മയ്ക്കുണ്ടായിരുന്നില്ല. ഒരു കാലത്ത്—നോക്കെത്താത്ത ഭൂതകാലത്ത് അമ്മ ആനന്ദിച്ചിരുന്നു. അന്ന് അമ്മ സ്വതന്ത്രയായിരുന്നു. അമ്മയുടെ സ്വാതന്ത്ര്യസംരക്ഷണത്തിന്നു പ്രാപ്തരായ വീരസന്താനങ്ങൾ അമ്മയ്ക്കുണ്ടായിരുന്നു. അവരെല്ലാം കാലചക്രഭ്രമണത്തിൽപെട്ടുമറഞ്ഞു – ഒന്നൊഴിയാതെ മറഞ്ഞു. സമത്വം, സ്വാതന്ത്ര്യം, സാഹോദര്യം ഇവയുമായി ബന്ധമില്ലാത്ത പലരേയും ഉപേക്ഷിച്ച്, പ്രപഞ്ചത്തിരയ്ക്കുള്ളിൽ അവർ മറഞ്ഞു. ഒടുവിൽ, അമ്മയുടെ സന്താനങ്ങളായി മററുള്ളവർ ശേഷിച്ചു. പരസ്പരവൈരാഗ്യത്തിന്റെ ഫലമായി നിതാന്തകലഹങ്ങളിൽപെട്ട് അവർ അമ്മയെ മുഴുവൻ നശിപ്പിച്ചു; അവർ തന്നെയും നശിച്ചു. അമ്മയുടെ സ്വാതന്ത്ര്യം പാരതന്ത്ര്യമായി രൂപാന്തരപ്പെട്ടു. അന്നുമുതൽ, അനേകം കാലങ്ങളായി അമ്മ അസ്വതന്ത്രമായ ആ കാരാഗാരത്തിന്റെ ഭയാനകതയിൽ കിടന്നു വീർപ്പുമുട്ടുകയായിരുന്നു. അമ്മയുടെ നിരന്തര പ്രാർത്ഥനയുടെ ഫലമായി, അമ്മയുടെ അവിശ്രാന്തവ്രതാനുഷ്ഠാനങ്ങളുടെ ഫലമായി, ഒടുവിൽ ഒരു ഓമനസന്താനത്തെ അമ്മ പ്രസവിച്ചു.

ആ ശിശു, ഈ കൊടുംകോളിളക്കത്തിൽ വളർന്നുവന്നു. നിസ്വാർത്ഥതയുടെ നിലാവെളിച്ചം വീശി, സമത്വസാഹോദര്യങ്ങളുടെ പ്രഭാപൂരം പരത്തിയ ആ ജീവിതം വിശ്വവശ്യമായിത്തീർന്നു. ബാല്യം മുതൽ, അമ്മയ്ക്കും സഹോദരങ്ങൾക്കുംവേണ്ടി ആ ജീവിതം അർപ്പിച്ചു. ഈ

ലോകത്തിൽ, മനുഷ്യജന്മത്തിൽ അനുഭവിയ്ക്കാവുന്ന സുഖാനുഭോഗങ്ങൾ അനവധിയാണ്. പക്ഷെ അവ ക്ഷണനശ്വരങ്ങളാണെന്ന് ആരും അറിയുന്നില്ല. ആ സുഖങ്ങളെ മുഴുവൻ ഒന്നാകെ ഉപേക്ഷിച്ച്, ആ സുഖങ്ങളുടെ അർത്ഥശൂന്യതയെ ലോകത്തിനു മനസ്സിലാക്കിക്കൊടുക്കാൻ വേണ്ടി ആ ജീവിതം ചിലവഴിക്കാൻ നിശ്ചയിച്ചു.

ആ മഹായോഗിയുടെ നിര്യാണത്തിൽ നനയാത്ത കണ്ണുകളില്ല; തരളമാകാത്ത ഹൃദയങ്ങളില്ല; കരയാത്ത മുസ്ലീംസഹോദരങ്ങളില്ല; ഹൃദയം തകരാത്ത കൃസ്തീയ സഹോദരങ്ങളില്ല; ദുഃഖാർണ്ണവത്തിൽ ആമഗ്നരാകാത്ത ഹിന്ദുസഹോദരങ്ങളുമില്ല. അതെ, അതായിരുന്നു ആ മഹായോഗിയുടെ ആദർശം.

അദ്ദേഹം ഒരു യഥാർത്ഥ ഹിന്ദുവായിരുന്നു; അദ്ദേഹം ഒരു യഥാർത്ഥ മുസ്ലീമായിരുന്നു; അദ്ദേഹം ഒരു യഥാർത്ഥ കൃസ്ത്യനായിരുന്നു. ഹിന്ദുമതതത്വങ്ങളിൽ അനുകരണീയങ്ങളായ ആദർശങ്ങളെ അദ്ദേഹം സ്വീകരിച്ചു. ഗീതയിലുള്ള തത്വങ്ങൾ അദ്ദേഹം 'പ്രായോഗികമായി ആചരിച്ചു. ബൈബിളിൽ പറഞ്ഞിരിക്കുന്ന സിദ്ധാന്തങ്ങൾ മനസാ വരിച്ചു. അതിൽ എള്ളിട തെററാതെ ജീവിക്കയും ചെയ്തു. കൊറാൻ അദ്ദേഹത്തിന്റെ ഹൃദയത്തെ അപഹരിച്ച ഒരു ഗ്രന്ഥമായിരുന്നു. അതും അനുകരണീയമായി വരിച്ചു. ആ മഹായോഗിയെപ്പോലെ ഹിന്ദുമതത്തെ അനുകരിച്ച ഒരു ഹിന്ദുവോ, കൃസ്തുമതത്തെ അക്ഷരംപ്രതി അനുഷ്ഠിച്ച ഒരു കൃസ്ത്യാനിയൊ, മഹമ്മദുമതത്തെ ആദർശമാക്കി ജീവിച്ച ഒരു മുഹമ്മദീയനോ ഇല്ല. അവിടെയാണ് ആ മഹായോഗിയുടെ മാഹാത്മ്യം സ്ഥിതിചെയ്യുന്നത്. പരസ്പരവൈരത്തെ പുലർത്തണമെന്നോ, ഇതരമതാനുയായികളെ ഹിംസിക്കണമെന്നോ ഒരു ഗ്രന്ഥങ്ങളിലും അദ്ദേഹം കണ്ടില്ല. ഏതു ഗ്രന്ഥങ്ങളുടെയും ഓരൊ വരിയിലും ഓരൊ അക്ഷരങ്ങളിലും വ്യക്തമായി കണ്ടിരുന്നതു്, സത്യം സമത്വം, സാഹോദര്യം ഇവയെ ആദർശമാക്കി ജീവിക്കുക എന്നതായിരുന്നു. ആ തത്വം അടിസ്ഥാനപ്പെടുത്തിയാണ് അദ്ദേഹം ജീവിച്ചതു്.

ആ മഹാത്മാവിന്റെ മസ്തിഷ്കത്തിൽനിന്നും ഉതിൎന്നുവീണ് വിജയം വരിച്ച ഓരോ സൃഷ്ടി പരിപാടിയും ഈ ആദർശത്തെ ആസ്പദമാക്കിയുള്ളതായിരുന്നുവെന്ന്, ആലോചിച്ചാൽ ആർക്കും മനസ്സിലാകാതിരിക്കയില്ല. അഹിംസ—അതായിരുന്നു ആ യതിപുംഗവന്റെ ആദർശങ്ങളുടെ അസ്ഥിവാരം. ഭാരതം, സ്വാതന്ത്ര്യമെന്തെന്നറിയാതെ. ദാസ്യവൃത്തിയിൽ കാലക്ഷേപം കഴിച്ചുകൊണ്ടിരുന്ന ഘട്ടത്തിലാണ്—ഓരോ ഭാരതീയനും "കറുത്തജാതി" എന്നുള്ള അപരാഭിധാനത്തിൽ ലോകമെങ്ങും അറിയപ്പെട്ടിരുന്ന കാലത്താണ്—പരിഷ്കാരം തൊട്ടുതേയ്ക്കാതെ, ജീവിതസ്വാതന്ത്ര്യംപോലും നൽകപ്പെടാതെ, അടിമത്വത്തിന്റെ അഗാധതയിൽ ഓരോ ഭാരതീയനുംആണ്ടു

കിടന്ന കാലത്താണ്—അഹിംസാസിദ്ധാന്തിയായ ഈ യുവയോഗി ആഫ്രിക്കൻ അന്തരീക്ഷത്തിൽ ഏകനായി ഉദയം ചെയ്തത്. ഈ അഹിംസാസിദ്ധാന്തത്തെ അപലപിക്കുന്ന പരിഷ്കാരവാദികൾ ഇപ്പോൾ ധാരാളമില്ലായ്കയില്ല.

എന്നാൽ അന്ന്, ആ ആദ്യകാലത്ത് ആർക്കും ഒരു ആദർശവുമില്ലാതെ, ആരും ഒരു ആശ്രയവുമില്ലാതെ, അനാഥരായി, അസ്വാതന്ത്ര്യരായി അധഃപതനത്തിൻെറ അഗാധതയിൽ ആണ്ടിരുന്ന കാലത്ത്, ഒരു അഭിപ്രായവും പുറത്തു വന്നിരുന്നില്ല. ഭാരതത്തിൻെറ ഭാഗധേയം നിർണ്ണയിക്കുന്നതിനുള്ള അവകാശവും അധികാരവും സ്വായത്തമാക്കിയ വെള്ളക്കാരുടെ മുൻമ്പിൽ തലപൊന്തിക്കുന്നതിനുപോലും ധൈര്യമുള്ളവരായി ആരും മുൻപോട്ടു വന്നില്ല. ഭാരതത്തിൻെറ സ്വാതന്ത്ര്യത്തിനുവേണ്ടി 1857-ൽ പടവെട്ടിയ വീരസന്താനങ്ങളുടെ ഗതി വീരസ്വർഗ്ഗമായിരുന്നു. ഭാരതത്തിൻെറയോ നിത്യനരകവും.

എന്നാൽ ഇന്ന്, തൻെറ അശ്രാന്തപരിശ്രമത്തിൻെറ ഫലമായി, അഹിംസാതത്വത്തിൻെറ അടിസ്ഥാനത്തിൽ കെട്ടിപ്പടുത്ത്, സത്യം, സമത്വം, സാഹോദര്യം ഇവയുടെ സഹായത്തോടുകൂടി പടവെട്ടി, ഊണും ഉറക്കവും ഉപേക്ഷിച്ച്, സ്വസന്താനങ്ങളുടെ മേൽനോട്ടത്തിൽ ശ്രദ്ധിക്കുന്നതിനുപോലും സമയം വ്യയംചെയ്യാതെ ഭാരതത്തിനും ഭാരതീയ സഹോദരന്മാർക്കും വേണ്ടി ബലിയർപ്പിക്കപ്പെട്ട ഒരൊററ ജീവിതത്തിൻെറ ഫലമാണ് ഇന്നു ലഭിച്ച സ്വാതന്ത്ര്യമെന്ന് ഏവനും സമ്മതിക്കാതിരിക്കയില്ല. ഈ സന്ദർഭത്തിൽ ആ വിഷയത്തിലേക്കു കടക്കണമെന്ന് എനിക്കാഗ്രഹമില്ല. അതിനിയും വേറൊരു സന്ദർഭത്തിൽ ആയിക്കൊള്ളാം.

ഇപ്രകാരം സ്വസുഖങ്ങളെ നിസ്സങ്കോചം ത്യജിച്ച്, സ്വസന്താനങ്ങൾക്കൊ, കുടുംബത്തിനൊവേണ്ടി എന്തെങ്കിലും ചെയ്യുന്നതിനുള്ള സമയംപോലും വ്യയം ചെയ്യാതെ, ഭാരതത്തിനും ഭാരതീയർക്കും വേണ്ടി ബലിയർപ്പിക്കപ്പെട്ട ഒരു ജീവിതമാണ്, ഒരു ഭാരതീയൻെറ നാലു വെടിയുണ്ടകൾക്കു വിധേയമായി ഇഹലോകം വെടിഞ്ഞത്. ആല്ലയോ ബാപ്പുജീ! അവിടുന്ന് ദയാലുവാണ്. അഹിംസയാണ് അവിടുത്തെ ആദർശം. ഭാരതത്തിൻെറ ഭാഗധേയത്തെ ഹിംസിച്ച ആ ഘാതകനോട് അവിടുന്നു ക്ഷമിക്കുമെന്ന് ഞങ്ങൾക്കറിയാം. എന്നാൽ വാദ്ധക്യത്തിൻെറ വടിമുകളേന്തി, സത്യധർമ്മാദികളുടെ അകൃത്രിമദ്യുതി വീശി, സാഹോദര്യത്തിൻെറ സമ്യക്പ്രഭാവം ദിക്കെങ്ങും വിതറി, സർവ്വവിധ ആഡംബരങ്ങളും തൻെറ സഹോദരങ്ങൾക്കും മാതൃഭൂമിയ്ക്കും വേണ്ടി ത്യജിച്ചതിൻെറ പ്രത്യക്ഷ ലക്ഷ്യമായി അർദ്ധനഗ്നനായി, സ്വസഹോദരങ്ങളുടെ സമുദ്ധാരണത്തിനായി നിതാന്തം ശ്രമിച്ച് ശക്തിക്ഷയം ബാധിച്ച വൃദ്ധനെപ്പോലെ ഊന്നുവടിയുമേ

ന്തി, കനിഞ്ഞു കനിഞ്ഞു് പ്രാർത്ഥനാമണ്ഡപത്തിലേക്ക . പ്രവേശിക്കുന്ന യോഗിവര്യനായ അവിട്ടത്തെ മുഖത്തു നോക്കിക്കൊണ്ടു് ആ ഹിംസാജന്തുവിനെ അഴിച്ചുവിടാൻ ധൈര്യം വന്ന അവിടത്തെ സഹോദരനെ—ആ ഭാരതീയനെ — ഞങ്ങളുടെയെല്ലാം സഹോദരനെ — നമസ്കരിക്കതന്നെ വേണം.

ഇന്നു്—അവിട്ടന്നു് ഞങ്ങളെ വെടിഞ്ഞു. എന്നാൽ അവിട്ടത്തെ അശ്രാന്തപരിശ്രമത്തിൻെറ ഫലമായി—അവിട്ടന്നു് ആദർശപരമായി നയിച്ച ജീവിതത്തിൻെറ ഫലമായി, ഭാരതത്തിൽ പൊതുവേയും ഓരോ വ്യക്തിയുടേയും ഹൃദയത്തിൽ പ്രത്യേകമായും ഉദ്ദീപിക്കപ്പെട്ടിരുന്ന ആ ദീപം ഒരുകാലത്തും പൊലിയുകയില്ല. ലോകാവസാനംവരെ ആ ദീപം ദിവ്യപ്രഭാപൂരം വിതറി പ്രശോഭിയ്ക്കും.

മഹാത്മൻ! അവിട്ടന്നു് ഞങ്ങളുടെയെല്ലാം ബാപ്പുജിയാണു്. അവിട്ടന്നു് സംവിധാനം ചെയ്തിരുന്ന വാത്സല്യസമ്പൂർണ്ണമായ ഈ ലോകത്തിലെ അംഗങ്ങളാണു് ഞങ്ങളെല്ലാം. ഞങ്ങളുടെയെല്ലാം ഭാവിയെ സംവിധാനംചെയ്യുക എന്ന ഗംഭീരയത്നമായിരുന്നു അവിട്ടത്തെ ജീവിതാദർശം. ഭാരതത്തിലെന്നല്ല, ഭൂഗോളത്തിൻെറ ഒരററം മുതൽ മറെറ അററം വരെയുള്ള ഓരോ വ്യക്തിയും, ഓരോ സമുദായവും, ഓരോ സംഘടനയും ഇപ്പോൾ കണ്ണുനീർ പൊഴിക്കുകയാണു്. കുടിൽമുതൽ കൊട്ടാരം വരെ, ശിശുമുതൽ വൃദ്ധൻവരെ സകല ജീവരാശികളും കരുണാമൂർത്തിയായ അവിട്ടത്തെ വിയോഗത്തിൽ ഹൃദയരക്തം ചിന്തുകയാണു്.

ആ അദ്ധ്യായം അങ്ങിനെ അവസാനിച്ചു. ഭാരതചരിത്രത്തിൽ ഇതുവരെ തങ്കലിപികളിൽ ഉല്ലേഖനം ചെയ്യപ്പെട്ടുകൊണ്ടിരുന്ന ആ ജീവചരിത്രത്തിനു പൂർണ്ണവിരാമമിട്ടു. ഇനിയും—ലോകം ഒരു മഹാപ്രളയത്തിൻെറ ഭീകരശക്തിയിൽ പെട്ടു് ഞെരിയുമ്പോൾ—ഞങ്ങൾ എങ്ങനെയാണു് അതിലേക്കെത്തിനോക്കുക. ഞങ്ങൾക്കു് ഇനി ഒരേ ഒരു വഴി മാത്രമാണുള്ളതു് — അവിട്ടത്തെ ആദർശങ്ങളെ ആസ്പദമാക്കി ജീവിക്കുവാൻ ശ്രമിക്കുക. ഞങ്ങൾക്കു് തെററുകൾ പററിയേക്കാം. എങ്കിലും അതിനുവേണ്ടി ഞങ്ങൾ ആത്മാർത്ഥമായി ശ്രമിക്കാം.

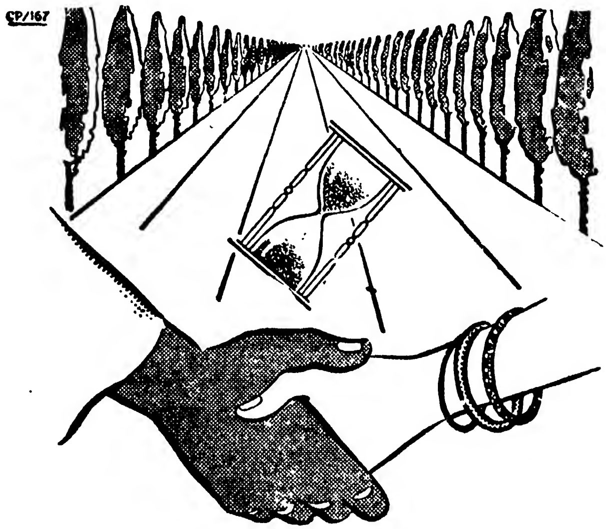
എഴുത്തുപെട്ടി.

ചോദ്യം 1:— പൂന്തോട്ടങ്ങളിൽ അമോണിയം സൾഫേററ് ഉപയോഗിക്കുന്നതിനുള്ള ശരിയായ രീതി എങ്ങിനെയാണ്?

ഉത്തരം:— പൂന്തോട്ടങ്ങളിൽ ഉപയോഗിക്കുന്നതിന് അമോണിയം സൾഫേററിന്റെ ആവശ്യമായ അളവ് ഒരു ചതുരശ്രഗജത്തിന് അര ഔൺസു മുതൽ മുക്കാൽ ഔൺസു വരെയാണ്. ഇതിന്റെ വിതരണം ക്രമീകൃതമാക്കുന്നതിനുവേണ്ടി ആകെ ആ തോട്ടത്തിൽ ഉപയോഗിക്കേണ്ട അമോണിയം സൾഫേററ് ഒന്നായി എടുത്ത് അതിന്റെ നാലൊ, അഞ്ചൊ, ആറൊ ഇരട്ടി മണ്ണൊ, മണലൊ കൂട്ടിച്ചേർത്ത് അതിനെ ആ തോട്ടത്തിന്റെ വിവിധഭാഗങ്ങൾക്കുപയുക്തമായ രീതിയിൽ ചെറിയ ഭാഗങ്ങളായി വിഭജിച്ച് മണ്ണിനു മുകളിൽ വിതരണം ചെയ്യണം. അനന്തരം ശരിയായി വെള്ളംകൊണ്ട് നനയ്ക്കേണ്ടതാണ്. ഭൂമിയുമായി ബലമായ ബന്ധം ലഭിക്കത്തക്കവണ്ണം പ്രായപൂർത്തി വരാത്ത തൈകൾക്ക് അമോണിയം സൾഫേററുപോലെ ശക്തമായ വളങ്ങൾ ഉപയോഗിക്കേണ്ട ആവശ്യമില്ല. ചെടികളുടെ വളർച്ച് അനുസരിച്ച് രണ്ടാഴ്ചയിൽ ഒരിക്കലൊ, അല്ലെങ്കിൽ ആഴ്ചയിൽ ഒരിക്കലൊ മേൽ പറയപ്പെട്ട പ്രകാരം അമോണിയം സൾഫേററ് വീണ്ടും വീണ്ടും ഉപയോഗിക്കാം. എന്നാൽ ചെടികൾ പുഷ്പിക്കുന്ന അവസരത്തിലും, അതിന് കുറച്ചു മുൻപുമാണ് ഇട്ടുകൊടുക്കേണ്ടതെന്നുള്ള കാര്യം പ്രത്യേകം ഓർമ്മിക്കേണ്ടതാണ്. അമോണിയം സൾഫേററ് ഉപയോഗിച്ചാൽ ഉടൻതന്നെ ചെടികൾക്ക് കൂടുതൽ ശക്തിയും, വളർച്ചക്ക് ഊർജ്ജസ്വലതയും സിദ്ധിക്കുന്നു. കഴിയുമെങ്കിൽ അമോണിയം സൾഫേററിനോടൊപ്പംതന്നെ സൂപ്പർ ഫോസ്ഫേററ് അതേ അളവിൽ കുറയാതെ ചേർത്തുപയോഗിക്കാം.

ചോദ്യം 2:— ചെടികൾക്ക് (Crotons) അമോണിയം സൾഫേററ് ഉപയോഗിക്കാമൊ? ഉപയോഗിക്കാമെങ്കിൽ അതിന്റെ അളവ് എത്രയാണ്?

ഉത്തരം:— സാധാരണ ഒരു ചെടിക്ക് കാൽ ഔൺസു മുതൽ അര ഔൺസു വരെ അമോണിയം സൾഫേററ് ഉപയോഗിക്കാം. അമോണിയം സൾഫേററ് മണ്ണോട് കൂട്ടിക്കലർത്തിയൊ അല്ലാതെയൊ ചെടിയുടെ ചുവട്ടിൽനിന്ന് അല്പം അകലെയായി മണ്ണിൽ വിതരണം ചെയ്യുക. അനന്തരം അതിനെ വീണ്ടും മണ്ണിട്ടുമൂടി വെള്ളംകൊണ്ട് നനയ്ക്കുക. അമോണിയം സൾഫേററ് ഉപയോഗിക്കേണ്ട ശരിയായ അളവ്, ആ ചെടിയുടെ വളർച്ചയെ ആശ്രയിച്ചാണിരിക്കുന്നത്. പുഷ്പിക്കുന്ന ചെടികൾക്കുപയോഗിക്കുന്നതുപോലെ കൂടെക്കൂടെ അമോണിയം സൾഫേററ് 'Crotons' ചെടികൾക്ക് ഉപയോഗിക്കേണ്ട ആവശ്യമില്ല. എന്തെന്നാൽ 'Crotons' ചെടികൾ സാവധാനത്തിൽ വളരുന്ന ചെടികളാണ്. അവയ്ക്ക് ഏകദേശം മൂന്നാഴ്ചയിലൊരിക്കൽ ഈ വളം ഉപയോഗിച്ചാൽ മതിയാകുന്നതാണ്. അമോണിയം സൾഫേററ് ഇട്ടുകഴിഞ്ഞാൽ അധികം താമസിയാതെതന്നെ സമൃദ്ധമായി വളർന്നുവരുന്ന പുതിയ ശാഖകൾകൊണ്ടും, പുതിയ ഇലകൾകൊണ്ടും ആ ചെടി മനോഹരമായിത്തീരുന്നതു കാണാം.



ചിരകാലസംരക്ഷ

ചിരകാലസംരക്ഷ ലഭിക്കുന്നതായ വല്ല സമ്പാദ്യവും തന്റെ ഭാര്യക്ക് ഏർപ്പെടുത്തിവെക്കേണ്ടതാണെന്നു് ഓരോ ഭർത്താവും വിചാരിക്കുന്നു! ഒരു സാധാരണ ഇൻഷ്വറൻസ് പോളിസിമൂലം ഒരു നല്ല തുക ഏർപ്പെടുത്തുകയെന്നതു് വിവേകപൂർവ്വമായൊരു നിക്ഷേപമായിരിക്കയില്ല. നേരെമറിച്ചു് വിവാഹിതകൾക്കുള്ള പൃഥ്വി പോളിസി, ഇത്തരമൊരു സംശയസ്ഥിതിയെ ദൂരീകരിക്കുകയും ജീവിച്ചിരിക്കുന്ന കാലത്തോളം അവൾക്കു് ഒരു നിശ്ചിതവരവു് ലഭിക്കുകയും ചെയ്യുന്നു. ഭർത്താവു് ജീവിച്ചിരിക്കുന്ന കാലത്തുതന്നെ—പരമാവധി 20 കൊല്ലം, പ്രീമിയം ഗഡുക്കളായടച്ചു് ഈ ആനുകൂല്യം നേടാവുന്നതാണു്.

കൂടുതൽ വിവരങ്ങൾക്കു് ആവശ്യപ്പെടുവിൻ:

പൃഥ്വി

ഇൻഷ്വറൻസ് കമ്പനി ലിമിറ്റഡ്

12, അങ്കപ്പ നായ്ക്കൻ സ്ട്രീറ്റ്, മദ്രാസ് 1

ബ്രാഞ്ച്: ഇസ്ലാമിയാ ബിൽഡിംഗ്സ്
മട്ടാഞ്ചേരി, കൊച്ചി.

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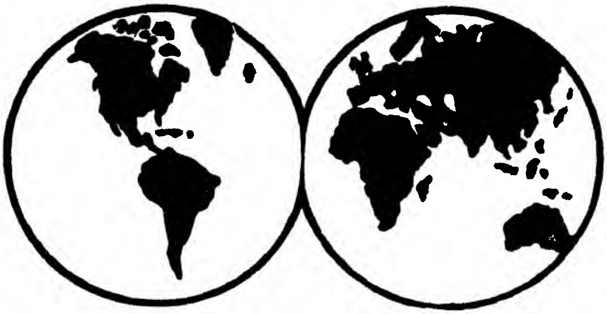
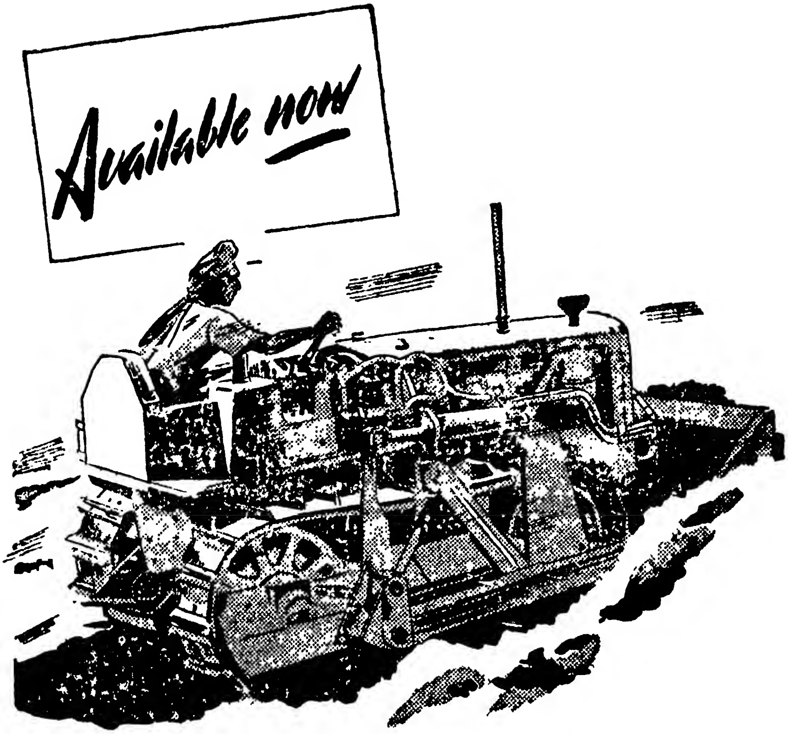
FACT

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FACT

Vol. 2. February 1948 No. 6.

In this Issue.....................

ENGLISH

മലയാളം

On the Cover Page:- You see a healthy "Lady's finger" Plant growing on famished soil entirely due to proper chemical treatment.

NATURE OF SOIL

1) Laterite Gravel,
2) Acidic in reaction,
3) Deficient in Plant foods like, Nitrogen, Phosphorous and Potash,
4) Soil subject to severe leaching,
5) Fertility potential low,
6) Unfit for intensive cultivation.

TREATMENT GIVEN

1) Limed to make it neutral (Dose — 5 oz per sq. yd.)
2) Ash applied to supply potash (Dose ... 5 lbs. per sq. yd.)
3) Weekly doses of a mixture of Ammonium sulphate and Superphosphate (Dose — ½ oz. of Am. Sulphate plus 1 oz. of Superphosphate.) — First application after two weeks of growth of the plant.

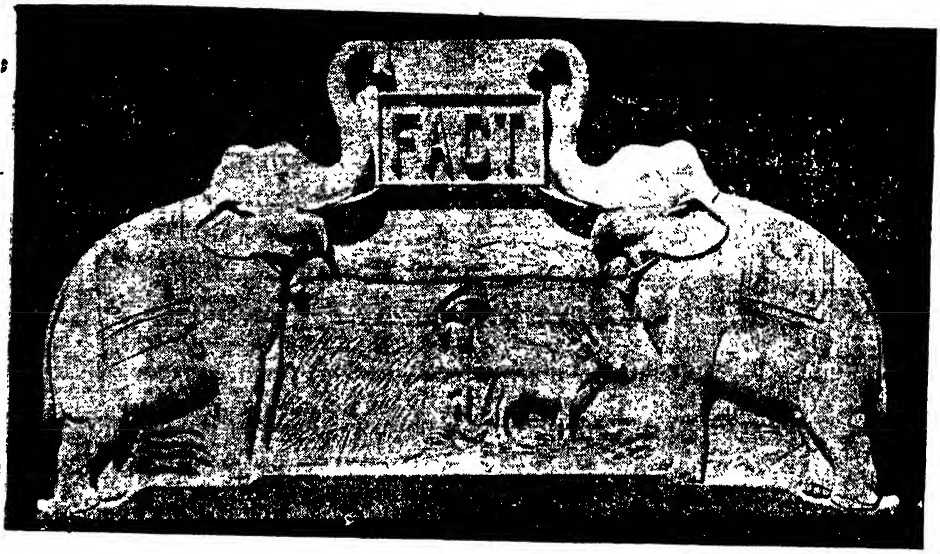
RESULT—Healthy Growth

"Creative work is making one blade of grass grow where none grew before".

AN EDITOR'S JOB

Getting out a Magazine is indeed a technique,
And not, as might appear anything like a picnic.
If you print jokes some say you are silly,
If you don't print them, some say you are chilly.
If you do clip things from other magazines,
You are branded as lazy and guilty of sins.
If you don't clip them you are puffed up, some say
And blame you for stuffing your things, your way.
If you don't print every word of a contribution
You are told to await a heavy retribution.
If you do print them, some may come down on you,
To unearth the things that have escaped your view!
If you make a change in the other fellow's write-up
You are 'found' too critical and blamed for the get-up.
If you didn't change it, it is called poor editing
And you are dubbed too weak to give a knock fitting.
Even this, some might say has been swiped from somewhere
And produce a dictionary to prove they are 'aware!'
Editing a Magazine is indeed a technique
And not as might appear, anything like a picnic.

PARKER



VOL. 2. | FEBRUARY 1948 | No. 6

EDITORIAL

A certain amount of unjustified criticism about the activities of FACT and its Sister Concerns have been voiced in some sections of the press. Though we feel justifiably proud of the contribution made by us to the industrial progress of the country, we may be pardoned for our desire to correct certain misapprehensions through the columns of FACT.

In a country where capital is shy, it is difficult for large industrial concerns like FACT to come into existence without the backing of Government. This Governmental help achieves the nearest approach to nationalisation of industry without vitiating the efficiency and competitive action traditionally associated with private enterprise. An industry of such vital import to the country in its period of shortages had necessarily to be national and necessarily private-managed. The conception and organization of FACT was a manifestation of this ideal fusion.

Chemical plants are by their very nature, complex. Correct technological knowledge and considerable experience are necessary before the planning of any chemical manufacturing plant of magnitude. The Indian Chemical Industry being so small in comparison with the needs of the country, the entrepreneur and the pioneer with the requisite knowledge and experience is a rarity. Conceptions of the size of FACT can necessarily be made only by a few in this country.

A radical departure from the ordinary processes had to be made if the scheme was to be workable in the south of India. Coal, generally the basis for the process is obtainable only in far-away Bihar, present as a national wealth, which if once consumed is irreplaceable. Firewood on the other hand, if scientifically regenerated over a large area could be a perennial source of the carbon necessary in the Ammonia production. Available in plenty in the Travancore Forests, firewood was the first raw material decided upon. The Travancore Government, active major partner in the scheme for the production of fertiliser, granted the Company a concession of exploitation over a portion of the Malayattur range, 113 sq. miles in area.

Gypsum, the other raw material, was present in the Trichinopoly District in one of the largest deposits in India. A process for the effective use of the gypsum as obtained at the mines was evolved after consultation with experts and was adopted. This permitted the tapping of an otherwise neglected mineral for the production of Ammonium Sulfate.

In line with the ultimate program for the manufacture of Superphosphate - another very vital fertiliser — a sulfuric acid plant was incorporated into the sulfate system permitting perfect flexibility of operation as well as giving a directly marketable heavy chemical. This step, considered the most useful departure from the original conception has been criticised for being a departure.

The location of the plant itself was fixed at Ellur for reasons perfectly obvious to at least two neighbouring industries. Water transport, access to port, road and railway facilities, power, good water, available land and nearness to raw material decided this issue for the promoters.

The river upstream of the factory, to be traversed by craft bringing firewood is to be dredged and maintained by Government as a navigable waterway to aid industries and general commerce. Dredgers have been bought by them for this purpose direct from American Suppliers and work is being done in the river now.

The contract for the design, purchase, export, receiving and erection of the plant including buildings was let to the Intercontinent Corporation of New York. The sub-contract for the gas production section was awarded to the Power-Gas Corporation, now principal contractors for the Government of India's Mammoth Fertiliser Project at Sindhri in Bihar. The sulfuric acid plant was brought from Monsanto Chemical Company, specialists in the field.

The remuneration for the contract was a fixed sum and not a percentage of the expenditure as seems to be widely believed. The contract covers design, purchase, technical supervision, recruiting of operating staff from America, training Indian personnel to operate the plant and does not terminate until a three month continuous production is demonstrated.

The Intercontinent Corporation have associated with them on this project, Messrs. Singmaster & Breyer, reputed chemical and metallurgical Engineers and Dr. Charles Owen Brown, recognized authority in Ammonia Synthesis. The remuneration and expenses of these experts are payable by T. I C. from their fees. The Power Gas Corporation were designers and suppliers of the gas production and purification systems.

Apart from the pioneering use of firewood as raw material the plant has other novel aspects, seldom if ever used elsewhere. The use of the steam-iron process for hydrogen manufacture for Ammonia Synthesis is a departure from the usual. The combination of the gypsum and sulfuric acid processes for manufacture of sulfate in the same system is also unique. To balance a plant of this nature and complexity, and to train and infuse confidence into the operating staff, to many of whom a chemical industry of this magnitude is new, will take a period of time, which Dr. C. O. Brown suggests will be as long as the construction period. Ignorance of the complexity of the problem has made some quarters unduly critical of the delay in reaching full production. All we can say is that the people who constructed the plant in record time have also got it in them to bring it into full production.

Minor difficulties which are perfectly normal in a new plant have been used as argument against the project and its success. The answer to this is full production which we confidently expect to reach in a short while since we have already produced 120 tons out of a rated capacity of 150 tons.

The staff engaged in the project are of the highest calibre available in India. They are being trained by American and English Chemical Engineers of considerable standing in their profession. The atmosphere of despondency sought to be woven about the project is absolutely unjustified as will be proved in a short while.

It is agreed on all hands that production must be stepped up several fold. By producing Ammonium Sulfate and Superphosphate we are contributi g substantially and directly towards the amelioration of our food problem. Sulfuric acid, Ammonia and other chemicals produced here are the raw material for several other industries.

FACT is conscious and proud of the pioneering step it has taken in the establishment of a type of industry, so woefully lacking in this land of opportunity It is content to be criticised, if in the process it makes the citizen of this country alive to the extremely retrograde thinking which some sections indulge in. We devoutly hope that the influence of these discordant notes do nothing to halt the progress in which lies the future of this ancient land.

Editorial Board.

National Standards in Industry

BY V. SESHASAYEE

> Reproduction of the talk broadcast from the Trichinopoly centre of All India Radio—By kind courtesy of the A. I. R. Trichinopoly.

STANDARDS in industry are alike in no two countries and in India particularly raw materials and the general set-up of industries differ from those of other countries. Raw materials used, processes of manufacture adopted, stage of industrial efficiency make for the variations in standards among the countries of the world. It is also well known that the requirements of purchasers in one country differ, sometimes in important respects from the requirements of purchasers in other countries. It is necessary that as far as possible there should be uniformity in the standards obtaining in the various Nations. It is a remarkable fact that twenty-eight important industrial countries have their own Standards Institutions. In India too when she geared to the war effort the various purchase departments of government had laid down certain specifications which had to be observed. It is encouraging, therefore, to record the move recently made by prominent persons to set up a non-official body for evolving standards. This non-official body is known as the Indian Standards Institution and will be managed by a General Council with the Minister for Industries and Supplies as its President and 64 Representatives from the Central Government Departments, Provinces, States, Research Institutions and Chambers of Commerce.

Standardization has become an absolute necessity in this age of industrialization and expanding trade within and between nations. Standardization however is not a rigid, inflexible process destructive of initiative and scope for improvement. Instead, it encourages industry to assimilate the benefits of scientific research and invention, rendering specialization in quality production easy of achievement. For this purpose is prescribed a uniform technique in production and agreed tests for machines, materials and finished products. Herbert Hoover of U. S. A. who gave a great impetus to standardization has called it by the term 'Simplification'. Standardising the optimum number of types, sizes and grades of manufactured products is really 'Simplification'. Industrial standards aim at ensuring quality, precision and performance not only in the production of machines and capital goods but also ordinary consumer goods. The producer as well as the consumer is interested in seeing that stipulated quality is maintained. In the long run it pays the producer

to create an enduring good-will and reputation for his products and the surest way to do it is for him to guarantee absolute satisfaction by strictly adhering to definite levels of quality and performance.

We take it that the Indian Standards Institution will introduce what we may call Standard Marks, the privilege for the use of which in conjunction with goods offered for use will be granted to only those producers who give satisfactory evidence of their ability to exercise strict quality control on production and provide laboratory and inspection facilities necessary for ensuring that the goods they produce conform to the relevent Indian Standards.

It will be realized that the opinion of both the producers and consumers must be backed by scientific tests and carefully planned investigations. Goods produced are classed usually under two heads.

(i) Consumer Goods and

(ii) Capital Goods, like machinery, with which to produce the former. India which is classed as the eighth industrial country in the world has not, with a few exceptions, many capital goods industries and has largely to depend upon foreign imports for them, not to speak of the innumerable consumer goods she is still importing in spite of the fact that these can be produced in our land itself, given the variety of ou immense raw materials, labour and sources of power. Goods, again, can be classified according as they are produced for consumption at home or for export abroad. Whilst it is only a truism that the consumer ought to get his money's worth in any transaction and that the excellence of the article should be the guiding factor in its purchase together with the need for it as felt by the buyer, it is not generally recognised with equal readiness that the same principle in regard to the quality of the products should be extended to the goods intended for export. For, after all, a shoddy article when exported carries only, so to say, a message of ill-will and ruins for ever the chances for the continuance of a flourishing trade between any two countries. The secret of the success of the great trading nations of the West is largely to be found, not in the cheapness of the articles but in their hall-mark of purity. If India is to capture new, and retain the existing foreign markets, she has necessarily to guarantee the uniform quality of her products. Manufacture of shoddy articles will result in our losing the Home market also. For there is nothing to prevent the consumer from patronizing foreigners rather than Indian manufactures.

What with the scarcity of dollar facilities, and Britain preoccupied with her unprecedented economic crisis, it is time for India to forge ahead in the economic field and this forging ahead can be made not by ideologies which will not help nor by mere paper plans but only, it must be constantly remembered, by production and yet more, production. Unfortunately, however, there seem at the moment very formidable difficulties in the way of

the realisation of this ideal of more production. The chief difficulty it may be pointed out, is the undoubted industrial unrest. One does not wish to minimise the reality of this unrest but as to the real need for it two opinions may, surely, be held. Who is responsible for this unrest? Is it the 'heartless' employer intent exclusively on making his pile, or is it the 'easily-misled' worker who, not knowing where his true interests lie, is egged on by 'self-styled' leaders who are determined to exploit both his credulity and helplessness? Unhappily the strike fever is becoming endemic and if this disease of the body politic is not cured without delay, it would only spell the ruin of our economic structure beyond repair. It is time for the State to step in and remedy our present ills not merely by legislation but by making of special powers whereby a strike or lockout will not normally be declared. It should be made clear to Labour and Management that if they should be in no mood to see reason, that the strike or lockout instrument is too dangerous a weapon to play with and that in the event of its actually being resorted to, Government will be forced to run the industry by itself. Conciliation and arbitration are well-known devices hitherto used in this country for the settlement of industrial disputes. Their effectiveness, however, is open to doubt. It is agreed on all hands that the future policy of the Government of this country will tend towards the establishment of industrial democracy. What Government should therefore strive to do is to maintain for the workers a standard of living consistent with the national economy. It is no use raising the wage level by cutting down profits because a rise in money wages without a corresponding rise in production would only lead to a rise in the price level and therefore a reduction in real wages. We come back, therefore, to the need for more production. It is being slowly recognised that the function of the State has henceforth to extend in various directions so that side by side with the securing of conditions favourable to industrial development provision shall be made for the securing of social amenities like education, medical relief, insurance, housing etc.

Every industrial plant is carrying on standardization of its own products and processes and its competitive success largely depends upon the cleverness and thoroughness with which it has studied and solved these problems. Standardisation within individual companies gives rise to collective standardization for entire industries. Such standardization by industries, carried on through their technical societies and trade associations naturally proves a necessary step in the development of the industry as a whole. This will again lead us to inter-industry or national standards on behalf of the industry and finally reach the stage of standardisation on an International scale. A large degree of such International uniformity can be claimed to have been attained in fundamen-

tal scientific nomenclature as in astrology, biology, chemistry, physics and the like. Standardisation has to be followed by the setting up of a 'Tolerance' limit and of a proper method of sampling and testing the product so as to see that it conforms to the standards within the limits of tolerance; for, it is obvious, that the maintenance of high standards in large scale production is not possible without quality control.

A word about dimensional standards which make for interchangeability of spare parts and even original ones. Instead of manufacturing whole machines in a single factory, producers tend to specialize in manufacturing component parts in different factories. These parts are then assembled to set up the entire machine as a perfect unit. The assembly line in the modern automobile factory has become a classical illustration of mass production methods which they make possible. One plant has succeeded in producing with a force of but 200 workers, 10,000 automobile frames per 24 hrs. This involves the manufacture in different places in the plant of 125 parts, which must be sure to fit; having these parts meet at one place on schedule; piecing them together at the rate of a complete frame every eight seconds; and doing this accurately 10,000 times a day. In industrialization of their countries, Japan and Russia have made extensive use of industrial standards of Europe and America. India can well adopt dimensional standards, and their adoption will prove a milestone in the road to her industrial progress.

A well-known example of this principle is seen in Switzerland in the watch-makimg industry where the components of each watch is made in the various cottages according to definite and well-planned standards and later on assembled by a co-operative society and the profits are distributed on a co-operative basis. This principle of standardisation of parts can be adopted to some extent to rural conditions in India and in each taluk centre co-operative societies can be established to make the various components necessary for a manufactured article, the components themselves being manufactured as a cottage industry in the villages. These components can later on be assembled in the taluk centre and distributed to the villages themselves through co-operative societies or the village officers. As suggested by the Electrical Inspector to the Government recently this principle can be adopted to the textile industry. But before doing this, a lot of paper work and planning will be necessary to standardise the various processes in the manufacture of cloth. Similarly with regard to wood furniture, building materials and bullock-carts. If all districts with large forest areas make the various components of doors and door frames, cots, chairs, tables, hubs, spokes &c, according to well-known standards these can be fitted up at one central place and distributed to the consuming areas. By this means all the spare parts necessary for the furniture and carts can be supplied.

This principle of standardisation will have the advantage of not disturbing the agricultural off-season as all the workmen need not be concentrated in large cities and factories for manufacture of finished products.

Industrial Relations

Text of the talk given by P. N. Krishna Pillai, Assistant Labour Commissioner, Alwaye, at the conference of the Employers of the Alwaye Area on 4th December 1947.

I had been to the United Kingdom and the United States of America with a view to studying the Industrial Relations in those countries. I had been deputed to the I. L. O., Geneva for a month to specialise in the same subject. On the continent of Europe, I devoted considerable attention to the study of the Industrial Relations Machinery, especially, in Sweden. In the light of these studies and experiences, I wanted to discuss the problem of building up a healthy Industrial Relations Machinery with the employers of Alwaye. I thank you for responding to the invitation and in assembling here to make this conference really a representative one. I wish to inform you that this will be followed by a conference of the representatives of labour and if matters progress as desired, it is my idea to convene a joint conference representing both labour and capital.

It is admitted on all sides that Industrial Relations are best in the United Kingdom. The main feature of it is that it is purely on a voluntary basis. It is the definite policy of the MINISTRY OF LABOUR AND NATIONAL SERVICE to encourage Trade Unions in all Industries. On the employers' side they are also organised on industrial basis. In all industries the Trade Unions concerned negotiate contracts regarding labour and working conditions with the Employers' Associations. The contracts are negotiated by what is called Joint Industrial Councils representing both the Trade Unions and the Employers' Associations.

I will illustrate this with the example of the Engineering Industry which was one of the Industries which I studied specially while in United Kingdom The Engineering employees are mainly members of the A. E. U. (Amalgamated Engineering Union) and some of them are members of the Electrical Trade Union or General And Transport Workers' Union etc. These Unions collectively bargain with the Engineering and Allied Employers' Association on wages, hours of work and working conditions in the Industry and enter into a contract. This contract will also provide a procedure for avoiding and settling disputes in the shop.

In U. S. A. also workers work only on similar contracts with the employers. The National Association of Manufacturers in U. S. A. has a prejudice against industrial bargaining and contracts on industrial

basis. So, there contracts are negotiated separately for each factory.

Sweden which is said to be the second best in Industrial Relations follows Great Britain and negotiates contracts on Industrial basis.

This method of working on contracts had not been tried in India to any large extent. The only instance where a voluntary joint negotiating machinery was created, as far as I know was in the Coir Industry in Alleppey. There the Travancore Coir Mats and Matting Association and the Coir Factory Workers' Union had built up purely on voluntary basis an Industrial Relations Committee which could be said to be analogous to the joint Industrial Councils in Great Britain. The fundamental defect of this machinery was that it never negotiated contracts for a definite period and that it did not provide any machinery for settling day to day grievances of the men on the bench from the shop level to the national level. The socalled Ahmedabad experiment of Mahatma Gandhi in the Textile Industry depended for its success more on the personality of Gandhiji than on the collective bargaining capacity of the parties. According to me you should not resort to compulsory arbitration in India before giving a fair trial for this voluntary joint negotiating machinery.

Let us see the advantages of this procedure. Here in Travancore as well as in other parts of India, in many instances, agreements entered into between the Union and the Management do not have the value of the paper on which they are written. There is always a tendency to place demands one after the other before the management, constantly with threats of incessant strikes. Instances of management flouting such agreements also do occur. So, there is no industrial peace even for a short period. If there is a contract on wages, hours of work and working conditions for a definite period, then the chances of placing new demands followed by threats of strikes will be minimised. Under this procedure, disputes will arise only in the three following ways:—

i. In negotiating a contract.
ii. In interpreting a contract.
iii. In the matter of day to day grievances inside the shop such as layoff, discipline, promotion and demotion etc.

In the United Kingdom disputes from these three sources are settled by the parties mainly on a voluntary basis. Some of the agreements may provide for an arbitrator to whom differences may be referred to for settlement. The Ministry of Labour also hold Joint Conferences to resolve differences that might arise between Labour and Management. One feature of these Joint Conferences is worth mentioning The officers of the Ministry will be presiding over these Conferences. But they never express any view on the merits or demerits of the questions discussed. All that they do is to furnish the necessary data for the party and to

conduct the negotiations in a highly skilled and technical way.

In U. S. A., they try to settle the difference in negotiating a contract mainly on a voluntary basis. It is not uncommon in U. S. A., to refer questions of interpretation of a contract to outside arbitrators. Some firms like the Ford Motor Company in Detroit have a permanent umpire for settling questions of interpretations, agreed to by both parties and retained by the payment of both parties The Conciliation Services of U. S. A. which was under the Department of Labour and which is an independent agency under the new Labour Management Relations Act (Taft-Hartly Act) have an approved panel of arbitrators who are well versed in Industry and Industrial Law.

I am afraid that in India the system of picking up adjudicators who are innocent of Industrial conditions from the judiciary has led to some sort of confusion in the industrial world.

In Sweden, where contracts are voluntarily negotiated, disputes regarding interpretation have necessarily to be referred to an Industrial Court, the decision of which is final and binding on the parties.

Here, in this country, we can take recourse to either of these systems in solving disputes regarding interpretation of contracts.

Even after this, disputes are bound to arise in the shop regarding day to day grievances of the men on the bench. The usual procedure adopted to solve this is as follows:-

The worker concerned will take up the matter with the foreman of his Department.

If it is not settled, then the shop steward of that department representing the Union will try to settle the matter with the Foreman concerned.

If it is not settled, at that level, the shop steward will take it up with the top Management.

In case, the dispute is not even then settled, it goes in United Kingdom to the Works Council in the Factory which is representative of the Union and Management. The majority of disputes would be settled at that level.

If it is not settled even then, the matter is referred to the Joint Industrial Council which is representative of the whole Industry from both sides, namely, capital and labour.

Here, in India, if a Union feels that there is any grievance due to such questions as layoff, discipline etc., then the next course is to call a strike whether successful or unsuccessful. This hampers production which is vitally needed to enable India to stand on her own legs. On the other hand, if there is a procedure for the avoidance and settlement of disputes on the above lines, the whole machinery will have to be exhausted before stoppage of work

and emotions will cool down and reason will prevail, as each process in the machinery is being tried.

You may ask me why you hear sometimes of strikes in England. During the period of last one year, while I was there, most of the strikes that took place were unauthorised strikes or wild cat strikes as the Americans would call them. The great road haulage strike, the Dock Strike in Scotland and the Miners' Strike in Yorkshire took place while I was there. I had the privilege to watch at close quarters from the Head Quarters of the Ministry of Labour and National Service how they deal with these strikes. They were all unauthorised strikes in the sense that they were not called by the Unions concerned. The Unions themselves, along with the Ministry were trying to call off the strikes, in which they ultimately succeeded.

It may also be worth mentioning in this connection that no negotiations are entered into while men are out of work.

Legislation plays only a small part in the Industrial Relations in Great Britain. It is very seldom that the Minister of Labour and National Service refers disputes to Industrial Court Even the decisions of the Industrial Court are not legally binding on parties but are invariably implemented by them.

It is to the advantage of the employers to recognise and encourage strong Trade Unions. I would like to point out two main differences that exist between the Unions in India and in other industrial countries.

Whereas in India non-workers who are outside politicians lead the Unions, in Great Britain and U.S.A., the leadership is purely from the working classes.

In India, due to this feature of outside leadership, rank politics enter the day to day working of Trade Unions while in the other two countries no stoppage of work occurs normally due to political reasons.

I would like to give just an instance. There was a proposal in the United States while I was there, to call a strike against the New Labour Law—the Taft-Hartly Act-which the labour considered to be against their interests. I need hardly say that the A. F. of L (American Federation of Labour) which never interfere in politics did not countenance the idea. What surprised me was that even Mr. Philip Murray, the President of the C. I. O. (Congress of Industrial Organisation) turned down that proposal.

You can compare this attitude of even militant American trade unionism with the stand the Indian workers took, as against the Bombay Industrial Relations Act. I feel that Indian trade unions will have to work mainly with working class leadership as pure non-political bodies if India is to achieve any industrial peace or progress.

I would also like to bring to your notice varicus joint activities carried on by Labour and Manage-

ments in the shops in United Kingdom, The Joint Production Committees were sponsored by Mr. Bevin during the last World War, and even now they are being encouraged by the Government. In some of the big industries which I visited, the management told me that these bodies were highly useful in their drive for more production. Canteen committees, safety committees and social committees are other joint bodies functioning in the factories with a creditable record. Besides, being useful in this sphere of their special activities these committees create the practice of mutual collaboration and lead to industrial concord. I think that these activities could be emulated with profit in our industries as well.

In coming to the conditions in this country, I wish to state that the situation in the Alwaye area is not altogether discouraging. I would appeal to the employers here to encourage proper trade unions. Since many of the industries here like Glass, Aluminium or Fertilizers have only one factory each, it may not be possible to organise Employers Associations on Industrial basis So, the practical thing to do would be to have an Employers Association for the Alwaye Area. Each Industry should have a joint Industrial Council representing both Labour and Management to negotiate contracts and settle disputes voluntarily. Then, I would suggest the creation of a Joint Industrial Council for the whole of the Alwaye area to which disputes not settled within the Industrial Joint Body could be referred for amicable settlement.

One of the defects that we come across in this country is that the Trade Unionists are not properly educated. You should excuse me when I say that the personnel managers or labour officers of the factories in this country also do not come up to this standard.

The Workers' Educational Association (W. E. A.) in England is doing great service in the field of educating trade unionists in that country. I had occasion to attend to some of their courses in the Burmingham University. The Universities in America are more renowned for their educational courses for trade union workers. Again, I had the privilege to participate in one of such courses conducted by the Wisconsin University. There is a course for personnel managers under the auspices of the Institute of Personnel Management in England, in the Universities of London and Manchester.

While at Bombay, I had an interesting discussion with Mr. Gulzarilal Nanda, the Honourable Minister for Labour, on starting a Training Course for Trade Unionists. I am glad to learn that the Bombay Government are going to open two such courses. It is high time for us also to move in this direction. It is my intention to make a humble beginning in this direction in the Alwaye area by starting a Training course for Trade Unionists and even for Labour Officers if the Managements would like to have it.

Spectroscopy in Metallurgy

BY

P. K. SESHAN, M. Sc., A. R. I. C.

SPECTROSCOPY, the age old study of light which started on the day when Newton placed a prism on the path of Sunlight, has been described by many foremost scientists of the world, as the Alladins lamp to unravel the mysteries of nature or a King Midas touch in the hands of a research worker. The space that the lamp had lit up is so vast that it can be said without an exception that there is no branch of human thought from A to Z - literally from Astronomy to Zoology - which has not benefitted by the radiance of the lamp.

The literature on the subject is so voluminous that nowadays it is split into different specialised branches emphasizing its application to various aspects of scientific thought and progress. In this article its application to metallurgy is reviewed. It is difficult to condense in a short resume, the volume of information that has grown in this particular branch in the last 20 years.

Before discussing the application of spectrochemical methods to metallurgy, I would like to quote the abstract of a few paragraphs from one of the best text books on the subject written by one who has devoted his lifetime for its development, so as to form an introduction to the scope and limitations of the subject.

"In any establishment which calls for the employment of several chemists, the use of a spectrograph becomes fully justified. Nothing rivals spectroscopy for detecting without the necessity of separation of minute quantities of metals present in any element, compound or mixture. Quantitative estimation can also be carried out with much greater speed than chemical ones and when the percentages are small the accuracy of determination is often in favour of the spectrographic method. In practice, the method is usually confined to detection of any or all the metals and a few nonmetals such as Arsenic, Selenium, Silicon, Tellurium, Boron, Carbon, Phosphorous; spectrochemical analysis is useful in the examination of almost every kind of substance, metals, alloys, liquids, powders, ores, soils, glasses, slags, vitereous substances, refractories, precipitates, residues, animal and vegetable tissues, fluids etc.

The spectrograph is not a delicate instrument only of use in a research laboratory, and when dealing with minute traces of impurities, nor must the technique and training for its correct use be considered suitable only for highly qualified physicists. For an intelligent youth or girl should after 2 or 3 months intensive training be capable of doing most useful work under

ments in the shops in United Kingdom, The Joint Production Committees were sponsored by Mr. Bevin during the last World War, and even now they are being encouraged by the Government. In some of the big industries which I visited, the management told me that these bodies were highly useful in their drive for more production. Canteen committees, safety committees and social committees are other joint bodies functioning in the factories with a creditable record. Besides, being useful in this sphere of their special activities these committees create the practice of mutual collaboration and lead to industrial concord. I think that these activities could be emulated with profit in our industries as well.

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The spectrograph is not a delicate instrument only of use in a research laboratory, and when dealing with minute traces of impurities, nor must the technique and training for its correct use be considered suitable only for highly qualified physicists. For an intelligent youth or girl should after 2 or 3 months intensive training be capable of doing most useful work under

proper supervision. While at first quantitative results should be continuously checked by chemical analysis, the agreement usually found between chemical and spectrographic estimation will gradually instil that confidence which will ultimately render chemical analysis unnecessary. But for obtaining relative proportion of the major constituents of any material, chemical analysis must be employed, the field of spectrographic analysis being essentially that of minor constituents and impurities. It therefore takes care of that field where chemical analysis is most difficult and unsatisfactory. Moreover the spectrographic analysis is more complete and less tedious. A complete quantitative analysis requires only an extremely small quantity of the substance. 10 Mg. is usually ample and even with smaller amounts good quantitative indications of minor constituents can be obtained—some times where chemical methods are well nigh impossible owing to the small amounts involved. Speed is one of the major advantages of the spectrograph and this becomes noteworthy when corresponding chemical analysis is difficult." (Twyman— Spectrochemical analysis of metals & alloys).

Among the methods employed for spectrochemical analysis, independent of or complimentary to chemical analysis, emission spectra, absorption spectra and fluorescence spectra analysis are the most important. The methods employed for emission spectra can be grouped into arc spectrum, spark spectrum and flame spectrum analysis. The principle employed in these is that, every element, particularly metals and a few of the nonmetals whether in solution, solid, compound or mixture shows characteristic emission lines in the spectrum when the light it emits when excited by any of the 3 above methods (arc, spark or flame) is analysed through a spectrograph. Knowledge of the characteristic lines of respective metals assist in the rapid detection of the presence or absence of the metal. This method is amplified to yield quantitative results by comparison of the intensity of the spectrum line emitted by a metal with a known standard as to compute relative proportions. In absorption spectrophotometry the principle employed is that every compound has characteristic absorption bands at specified wave-lengths which can be used almost as finger prints for detection, and the intensity of absorption will be in proportion to the amount present. This technique has some limitations in the inorganic analysis though it is extensively used in study of organic compounds but recent developments of micro-analysis have placed several organic compounds which form characteristic organo-metallic compounds which are specific for certain metals. In every application of calorimetry an unconscious application of spectrophotometry is made. In fluorescence spectra, the light emitted by the excitation of the molecules in a substance by ultraviolet light is used for detection and measurement of the quantity

present. This method finds particular application in metallurgy to rare earths and several fluorescent and phosphorescent minerals and is extensively used in organic and biological chemistry.

Several specialised equipments for different types of spectrum analysis are available. Some leading optical manufacturers have taken special interest in making the necessary equipments for these methods and are doing valuable research work in the field.

In a modern well-planned metallurgical laboratory for study of ferrous and nonferrous metals it is desirable to have a spectrochemical section to form the nucleus of all studies of application of optical methods to chemical analysis. It is desirable to have as complete an equipment as possible so that any type of problem that is likely to crop up in the study of metallurgy can be tackled. Incidentally these equipments can also assist for elucidation of other applied and allied problems in Industrial Chemistry & Chemical Engineering.

It will be interesting to cite a few well-known applications to metallurgy. Recent publications such as chemical abstracts, recent advances in analytical chemistry, metallurgy, physical chemistry, micro-chemistry and spectroscopy abound in so many such instances that one cannot even attempt to summarise them.

Spectroscopy is used widely in *Aluminium Industry* to detect traces of impurities which are highly harmful in the anodic formation of aluminium by the use of electrolytic condensers, to analyse aluminium alloys and Duralumin, Alpax, Silumin, etc. to their standard specifications and for the rapid analysis of percentage of several metals in aluminium and its alloys such as nickel, copper, magnesium, iron, titanium, chromium, lead, zinc, tin, silicon, etc.

In *Cadmium* industry this method is used for testing purity of cadmium for electroplating, as traces of several metals (e. g. 0·001% of thallium) are objectionable. In *Gold*, *Silver*, *Platinum* and such noble metals, spectroscopy is a standard method used by the Mints and chemists for assaying the purity, or detecting traces of impurities present.

In *Copper*, *Nickel*, *Chromium* and such nonferrous metals, this method is used for testing the purity of metals, to find impurity limits to specification, to rapidly determine concentration limits of components in brass, bronze, phospher bronze, gun metal, special alloys as arsenical copper, cupro-nickel or cupro-nickel chrome alloys and a variety of such uses. British Non - Ferrous Metals Association have published two books on spectrographic analysis.

In *Lead*, *Zinc*, *Tin* and *Antimony* smelting, the spectrograph is used for a variety of purposes such as the rapid detection of the

type and composition of alloys-scrap for sorting them out; determining the composition of the ingot to decide whether the ingot is of specification composition or pure metals are to be added; to control the production of high grade individual metals for special chemical engineering purposes; and for analysis of special alloys of known and unknown compositions.

In *Magnesium*, *Nickel*, *Chromium* industries this method is used largely for works control of production, to determine pollution of electrodes and electrolytes, purity of product, refining and commercial analysis.

In *Iron* and ferrous metallurgy the Admiralty, and several such institutions and factories use this method as a standard for routine test and laboratory inspection for the presence of several elements such as silicon, manganese, nickel, chromium, molybdenum, vanadium, titanium, cobalt, copper, aluminium etc. in carbon steel, nickel steel, nickel chromium steel, molybdenum vanadium steel, manganese molybdenum steel etc. Quantitative determination of carbon, aluminium, copper, silicon, manganese, nickel, chromium, molybdenum, vanadium, tungsten, titanium etc. is made by this method. In Michigan U. S. A. a spectroscopic technique for super rapid analysis of cast iron has been developed whereby 6 elements chromium, copper, manganese, molybdenum, nickel and silicon could be determined so quickly that it can be used for controlling the slow changes or drifts in the concentration of the several alloying constituents in molten iron in the furnace of cupola.

Instances like these can be catalogued in plenty but it is considered beyond the scope of the present resume which is more intended to serve as a rapid survey on the importance and application of this spectroscopic technique to solve problems in metallurgy with a view to plan a spectrochemical laboratory.

If the reader is able to get a peep into the forest of the mysteries of science which this Alladins lamp has lit up, I have achieved my object in writing this.

A Shavian Guess

A London society woman having spent a large amount of money on beauty treatments is reputed to have asked George Bernard Shaw:-

"How old do you think I look ?"

G: B. S. (looking her up and down):-" Judging by your teeth I should say 18; by your blonde curls 19, and by your attitude 14."

The lady was flattered and said, "Thanks for the compliments, but still, how old do I look ?"

G. B. S. "Well, add together 18, 19 and 14."

WOOD-AN INDUSTRIAL RAW MATERIAL

By

N. D. GOPINATH, B. Sc., F. I. C. S.,
Asst. Supt., Chemical Control Division of F. A. C. T. Ltd.

WOOD is an important raw material in Chemical Industry. It forms part of the structural materials for buildings, tanks, vats etc. Wood due to its resistance to dilute acids, salts and organic materials finds a good place in chemical industries like Dyeing, Rayon and Paper. The utilization of waste products from wood had considerable attention from the Industrial Chemists in recent times with the result that today no waste product from wood is thrown out. Our Producer Gas plant, consumes approximately 280 tons of wood per day and we get tar, ash and saw-dust as the main bye-products. Such bye-products have been exploited by eminent chemists for the manufacture of various chemicals and articles of every day use. Research on those lines are being conducted to exploit these bye-products to the maximum extent, here.

WOOD AS FUEL AND A SOURCE OF POTASH

Wood is one of the oldest and main sources of fuel in this country. It is used as fuel for industrial purposes by power generators, wood-working plants, etc. The ash from wood was one of the sources of Potash. But after the commencement of commercial production of potassium salts from Strassfurt deposits, the value of wood-ash as a source for potassium disappeared.

PAINT & VARNISH

Tar forms one of the main constituents of wood distillation. Moisture resisting paints have been developed by processing crude tar. The viscous mass obtained by heating crude tar from Soft wood with concentrated alkali is separated from unsaponified material and then warmed with formaldehyde in naptha to give a moisture-proof paint.

Soft wood-tar free from oily fractions is treated with hardening agents like lime to yield a resinous material which can be used as a quick drying glossy varnish.

On chlorinating wood tar a similar black resinous mass results which, on dissolving in alcohol, yields a quick drying black varnish.

SAW DUST

Saw dust is commonly used for the production of oxalic acid. The manufacture of oxalic acid by the caustic fusion is well-known. The calcium oxalate on treatment with sulphuric acid yields free oxalic acid. The average yield of oxalic acid is 80–81% but yields upto 94% are possible. The acetates of different woods can be obtained by esterifying saw-dust with acetic anhydride in the presence of a cata-

lyst like sulphuric acid or pyridine. The acetylation of saw-dust for the plastic-moulding material has been the result of this investigation.

DISTILLATION PRODUCTS

The common uses of wood-distillation products are known to all. Methanol, acetic acid, methyl acetate, tar, oil, gas and charcoal are the main constituents of wood distilation.

WOOD TAR

Paint, Varnish and plastic materials are manufactured out of wood tar. Besides, the tar yields pitch useful as a rubber softener and electrical insulator. The various grades of wood-tar oil are employed for wood preservation and as insecticides. Some of the grades of wood-tar oil on purification and distillation yield Guaicol (closely associated with tuberculosis) and wood creosote. Any residue out of tar distillation can be used as fuel for Boilers.

PLASTIC INDUSTRY

Wood as chemists know, consists primarily of cellulose, lignin and sap, the sap containing resins and dissolved material. The average lignin content of wood is about 26%. The lignin and resin form the basis of plastics from wood. Resins are formed on heating wood with phenol and a small amount of Hydroiodic acid, due to the condensation of phenol and lignin. Saw-dust on treatment with alkaline oxide in presence of weak acid and under controlled conditions of temperature, yield plastic materials. The main constituents of Pyroligneous acid are methanol, acetic acid and tar, besides small amounts of aloehyde, ketones, amines and phenols. The tar-free pyroligneous acid on treatment under reflux for several hours yield phenol–aldehyde plastics. Polymerization of soluble tar also gives moulding resins.

The wood and lignin-plastics are still largely in the development stages and nothing definite about their uses and value to chemical industries could be said at this stage.

Punctuation Problem

Every lady in this land
Hath twenty fingers on each hand
Five and twenty in hands and feet
And this is true without deceit

(.. ...By proper punctuation, make sense out of the apparent nonsense in the above lines

Brain Teasers

1. A clock takes 6 seconds to strike six. How many seconds does it take to strike twelve ?
2. How many times does the long hand of a clock cross the short hand in a day of 24 hours ?

For answers please see page 24.

Application of Fertilisers to Paddy Cultivation

BY T. S. RAMAKRISHNAN, B. Sc. (Ag.),
(Fertiliser Expert, F. A. C. T. Ltd.)

Paddy is our staple food crop and there is a large acreage under this important crop in South India.

Area under paddy in Madras Presidency - over 100 lakhs of acres.
" " Travancore State - 6.63 lakhs acres.
" " Cochin State - 2.0 lakhs of acres.

THE most desirable requisites for successful paddy cultivation are a relatively high temperature, a dependable and copious water supply, a level land, an impervious subsoil and a good surface drainage. All these we have in most of our rice-producing areas and yet our average paddy yield per acre is very low indeed, which fact is clearly brought out by the tabular column given below:—

Country	Average yield in lbs. per acre 1931 - 1936	1938-1939
1. India	829	728
2. Burma	845	959
3. U. S. A.	1413	1469
4. Italy	2963	2903
5. Spain	3709	-
6. Egypt	1799	2153
7. Japan	2053	2276

We find our country occupying an unenviable position in the matter of acre-yields. The main cause for this tragic position is the complete exhaustion of our soils, brought about steadily by continued intensive cultivation accompanied by inadequate manuring. This point will be more clearly understood if we remember the fact that an acre of paddy crop removes from the soil nearly 48 lbs. of nitrogen, 23 lbs. of phosphoric acid and 41 lbs. of potash during its growth. No wonder our soils have lost most of their productive power; they do expect these manurial elements, that they give in the form of grain and straw, to be returned back to them. Our soils now cry out for an intensive and generous manuring scheme. Unless we feed our soils we can't reasonably expect them to feed us in return. The saying that the health of the community is directly proportional to the health of the soils is a truism. The present acute food shortage has forced us to understand more fully the importance of manuring and the necessity to increase the present poor yields of our lands and this we can accomplish only by a liberal use of manures and fertilizers.

AMMONIUM SULPHATE

Its capacity to increase paddy yield.

Ammonium Sulphate is a quick acting, concentrated, nitrogenous

fertilizer, supplying 20–21% nitrogen in the ammoniacal form. It is the most largely used nitrogenous fertilizer in the world. Field experiments conducted both in our country and abroad have proved beyond doubt its efficacy in improving crop growth in a substantial manner. It is a well known fact that most of the South Indian soils have become highly deficient in their nitrogen content, which fact is not strange as ours is a tropical country, where soil-nitrogen will be easily lost. Ammonium Sulphate supplies this all-important plant--food, Nitrogen (which is the sole limiting factor for plant growth) in a readily available and an easily assimilable form.

It is an ideal fertilizer for the paddy crop. This particular crop is normally grown under aquatic and semi-aquatic conditions, which do not favour the formation of nitrates in the soil by bacteria; but ammonium compounds can not only be formed but definitely be retained in the soil. Consequently paddy crop shows a distinct preference to nitrogen supplied in the ammoniacal form and there is always an admirable response to the application of ammonium sulphate.

Again, ammonium sulphate is a fertilizer which, though readily soluble, is not easily washed out of the soil, as it is in the case of other nitrogenous fertilizers like sodium nitrate. The soil colloids (the clay and humus portions of the soil) have the power to adsorb and retain ammonia in them and thus the plant-roots are able to get a steady and continuous supply of nitrogen from them.

EFFECT ON THE CROP

When ammonium sulphate is applied to the field, it readily dissolves in the water and becomes available to the crop *immediately*. As mentioned earlier the ammonia in it is retained in the colloidal complex in the soil-body, from which the roots take it in. This sort of ready intake of nitrogen shows its beneficial effect on the standing crop at once even within a week's time. Rapid growth, vigorous development, a healthy dark green colour, profuse tillering-these are some of the immediate effects of ammonium sulphate on the crop. An enhanced grain and straw-yield is the ultimate effect.

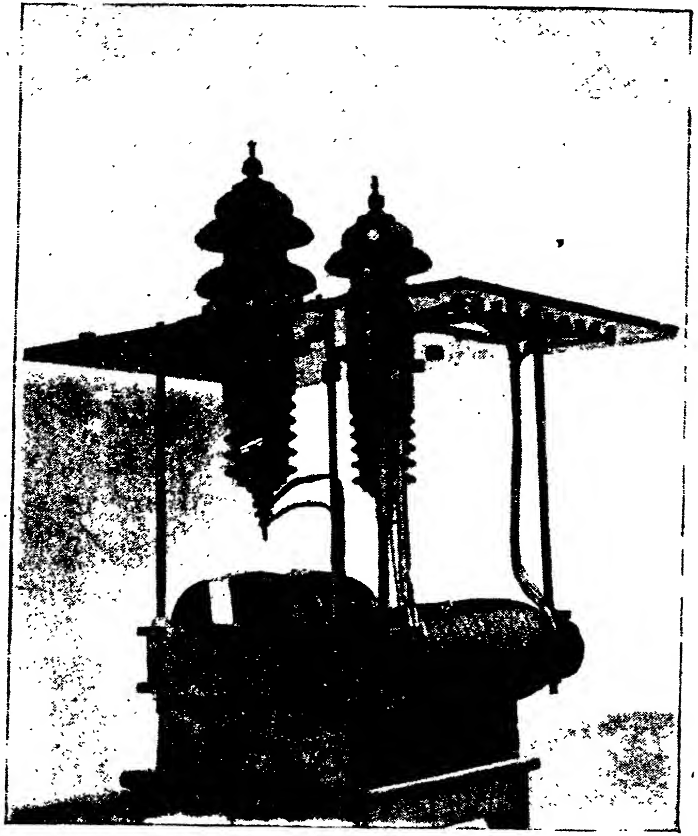
Field experiments have confirmed a high response that paddy always shows to ammonium sulphate. Some of the field tests conducted in California, U.S A., record such high responses as more than 1000 lbs. of additional yield per acre for a 100 lbs. dose of ammonium sulphate * (Ref. Technical Bulletin No. 718, April 1940, Dept. of Agriculture, U.S.A.) Though responses always vary from soil to soil depending upon its deficiencies and fertility potential, yet when we consider the poverty of our soil with regard to their nitrogen content and the other important fact that an acre of paddy crop needs 48 lbs. of nitrogen for healthy growth, we can always expect a substantial increased yield on application of ammonium sulphate.

DOSE

The optimum dose of ammonium sulphate for paddy

MR. L. C. McCARTY, JR.
of the Intercontinent Corporation

MR. H. G. FELIO
of the Intercontinent Corporation



THE ELECTROSTATIC PRECIPITATOR
(See FACT News)

President ... ... and ... ... President

SRI. THANU PILLAI,
Who inaugurated the F.A C.T. Employees Association

SRI. P. N. MENON,
President of the F.A.C.T. Employees Association

crop depends upon many factors, such as, the nature of the soil, its previous history regarding fertility, basal manuring given to the land, the variety of paddy grown, etc. But normally the proper dose of ammonium sulphate to be applied varies within a range of 100 to 150 lbs supplying 20 to 30 lbs. of nitrogen per acre. This dose will be quite adequate for most of the producing areas.

METHOD OF APPLICATION

This quantity of ammonium sulphate can be applied either alone or in conjunction with other organic nitrogenous manures like oil-cakes or green leaf.

(a) Straight Application

If the ammonium sulphate is to be applied alone the following procedure may be adopted. Great care has to be taken to see that the sulphate is as uniformly distributed over the fields as possible. With a view to facilitate even distribution the sulphate can be diluted with some inert material like fine sand or soil about 4 times the volume of the sulphate. This mixture can then be scattered over the field by an even sweep of the hand. Farmers who are skilled in paddy sowing can easily do this and can attain a high rate of uniformity in distribution. In doing this the farmer should have an idea as to the probable extent of each of his fields. He can then divide the total quantity of the sulphate (straight or diluted) into several small heaps, that may be in proportion to the areas of his fields.

(b) In Conjunction with Oil Cakes

Ammonium Sulphate can also be profitably applied in combination with oil cakes, preferably, ground-nut oil-cake, which normally has an analytical value of over 7% nitrogen-content and is decidedly the richest among the several oil cakes available in the market for manurial purposes. The proper and convenient mixed dose that can be recommended for an acre of paddy will be 400 lbs. of ground-nut cake and 112 lbs. of ammonium sulphate. This mixture will fully meet the nitrogen requirements of the crop. It is important that the cake must be well powdered and then intimately mixed with the sulphate. The mixture can then be applied broadcast over the fields, as described in the case of straight application. However, no dilution will be necessary in this case. The oil cake not only supplies nitrogen but also makes available small amounts of phosphorus and potash (1·4% and 1·2% respectively.) This combined dose of organic and inorganic nitrogen will not fail to show a substantial additional yield.

(c) In Conjunction with Green Leaf

Green leaf is one of the ideal manures for the paddy crop. The incorporation of large amounts of green leafy matter has a highly beneficial effect on the structure of the soil, as it helps in the granulation of the stiff clay particles and also binds up loose sandy soils. The green leaf is recommended not so much for the amounts of plant foods it is able to supply (which, by the way, is very low) but for its tonic effect on the soil-body. A basal application of not less than 2000 lbs. of green leaf may

be recommended for an acre of paddy land. This must be incorporated earlier, during the process of puddling the soil. It can be applied after 4 or 5 ploughings and then well pressed down. Later after a week's time the land has to be ploughed once more and the levelling broad drawn. A month later ammonium sulphate (dose 100-150 lbs.) can be applied. The humus produced by the rotting of the green leaf improves the soil and also absorbs and retains the ammonia and thus feeds the crop steadily and continuously. Green leaf being slow in action is applied earlier while ammonium sulphate being quick in action is only applied much later to the standing crop.

PROPER TIME FOR APPLYING AMMONIUM SULPHATE

Many field experiments have been conducted to determine the best time for applying ammonium sulphate, to get the most profitable results. The recorded results of these various field tests conclusively prove that the optimum time for applying sulphate is one month after planting. Experiments have shown that the paddy crop needs more nitrogenous food during the later stages of its growth and hence it will be more economical to apply this nitrogen-supplier at this "hungry-period". This fertiliser, as mentioned earlier, will become available to the crop almost immediately.

But it must be remembered that all paddy varieties are not of the same duration. Their growing seasons may vary from just 100 days to even 6 months or more. Thus in the case of long duration varieties the time of application has to be postponed further say; 50 to 60 days after planting. However the sulphate has to be applied preferably prior to the start of tillering.

Another point to be remembered is to weed the field before applying ammonium sulphate. This is to avoid loss of nitrogen by profuse growth of weeds. It is always desirable that there should be water standing on the field when the sulphate is broadcast. One need not fear as to the leaching out of the applied sulphate, as the ammonia is readily and easily absorbed into the soil colloids.

A split-dose application may also be recommended for the paddy crop. According to this, the dose to be applied is split into two halves-one half to be applied at planting and the other half to be applied one month (or later depending upon the duration of the variety) later. This two dose application naturally involves more labour and those who have facilities can adopt this method. Any way, it must be emphasised that a full dose *at the time of planting* should not be resorted to, as it will not be profitable.

RESIDUAL EFFECTS OF AMMONIUM SULPHATE

Though the ammonium sulphate applied directly goes to feed the standing crop, it has a residual effect on the soil by increasing the amounts of plant residues left in it after harvest. As the dose (of 100-150 lbs.) recommended is the bare minimum

necessary for feeding a single paddy crop, the application has to be renewed for each successive crop raised on the land.

NOTE ON LIMING

Before we go into the action and application of superphosphate for paddy, it will be appropriate to emphasise the necessity of liming our paddy soils, particularly those occurring along the West Coast including Travancore State and Cochin State. Most of the soils in Madras Presidency contain fairly adequate quantities of lime in them but the case is quite different with West Coast soils, which on detailed analysis show a serious deficiency in calcium and are decidedly acid in reaction. Lime has many important functions in the soil, among which, the most important being its capacity to check the development of acidity or sourness, which is so detrimental to plant life, its hastening effect on the decomposition of organic residues and its power to improve the structure and the ultimate health of the soil. The importance and urgency of liming the soil to improve its health cannot be over emphasised. Lime can be safely applied in the form of chalk (calcium carbonate)—the dose, (though variable depending upon the calcium requirement of the soil) may vary within 1 to 2 tons per acre. Our factory supplies calcium carbonate in a finely powdered form, highly suitable for bringing down the acidity. The chalk can be applied over the soil after harvesting the paddy and then it can be ploughed and worked into the top soil—OR, it can be applied prior to the first ploughing given during the process of puddling that is generally carried out before the actual sowing of paddy. During the preparation of the puddle the fine chalk gets intimately mixed with the soil particles and it directly goes to improve the structure and the final health of the soil. It is not necessary to apply chalk every year. It is enough if it is applied once in 3 or 4 years.

NECESSITY FOR PHOSPHATIC FERTILISERS

Phosphorus is one of the most indispensable plant foods—it is one among the Big Three (viz. nitrogen, phosphorus and potash). It has very important physiological effects on plant growth. Lack of phosphorus in the soil results in, poor stunted growth of the crop, delayed maturity, a decided decrease in flowering and fruiting capacity, poor pollination and seed-formation and a low grain-yield. Most of our soils show a serious deficiency in phosphorus, particularly those of West Coast. In this connection it must be remembered that the sourness of the West Coast soils prevent whatever amounts of phosphorus there may be in the soil from becoming available to the crops. In spite of the reserve-potential of phosphorus, the actually useful amounts of phosphorus as dissolved in the soil-solution will be negligible and quite inadequate for healthy plant-growth. Hence such soils demand liberal and repeated

applications of phosphatic fertilizers like super-phosphate. If the acidity is properly neutralized by applying optimum amounts of chalk, then there won't be any fear of the applied phosphorus being fixed up in a non-available form.

EFFECT OF SUPER-PHOSPHATE ON THE CROP

Superphosphate supplies phosphoric acid in a readily available and soluble form (18-20%) which can be immediately taken up by the plant-roots. Phosphate feeding at once induces greater root development and vigorous growth, early maturity, a high rate of seed formation and a substantially higher grain yield. The quality of the seed also will be generally very high.

There is absolutely no fear of the manurial element in the super being washed out of the soil. It stays in the soil and feeds the plants. It also has a high residual effect.

DOSE

There will obviously be a great variation from soil to soil in the proper dose of superphosphate to be applied. The exact dose depends upon the degree of deficiency in that particular soil and other factors such as lime deficiency, sourness, etc. But yet the normal dose of super for paddy varies within a range of 1 to 2 cwts. per acre. Generally West Coast soils demand a higher dose of super than those in the East Coast of the Madras Presidency.

In this connection it may be mentioned that our factory has all facilities for carrying out soil analysis and determining the deficiencies of a particular soil. We will be very glad to advise our consumers as to the correct amount of phosphatic and other fertilisers their soils need.

METHOD AND TIME OF APPLICATION OF SUPER

Field tests conducted so far go to show that super-phosphate is best applied as a single dose at about the time of planting, that is to say, it can be applied during the preparation of the puddle. Superphosphate is generally broadcast over the field and then during the subsequent ploughings it is worked into the puddled soil. This mechanical mixing of the phosphate with the soil is more desirable and it always results in a better response, for we must remember the fact that normally the downward movement of phosphorus in the soil is not great and hence a deep working in of the super is to be preferred to a surface broadcast application.

However if owing to some unavoidable causes the super had not been applied earlier during the puddling process, then it can be applied along with ammonium sulphate—the two being intimately mixed together.

Answers to Brain Teasers on Page 18:—

1. 13⅓ seconds.
2. 22 times

Question Box

In this section answers are given by our Soil and Fertiliser Expert to Questions received from the Public on soil, agriculture and use of Fertilisers

Question. No. 5.

Can Ammonium Sulphate be used as a liquid manure? If so what is the proper strength in which it should be dissolved?

Answer:

Yes. Ammonium Sulphate is easily the richest of the nitrogenous fertilisers on the market. It should be dissolved in water in the ratio of half an ounce per gallon. This nitrogen-solution (as it may be called) can be used effectively for vegetable crops, flower beds, lawns, amaranthus (cheera) beds, etc. While using this liquid manure the following points should be kept in mind. (1) The liquid manure should not be applied to very young and tender seedlings. (2) Don't apply it on dry ground. (3) Flush the beds with water prior to the application of liquid manure. (4) Don't make the solution stronger than that prescribed here—otherwise the plants will not be able to absorb it. (5) Apply this solution exactly when you want results—its effects on the crops is immediate. (6) Application can be renewed once a week if necessary.

Question No. 6.

What is meant by the term "Black Alkali"? How can we reclaim such an alkaline soil?

Answer:

Soils that contain a lot of sodium carbonate dissolved in the soil-solution are termed black alkali. This salt is the most injurious among the salts that are commonly met with in alkaline soils. Sodium carbonate readily hydrolyses producing sodium hydroxide, a very strong alkali, which at once acts upon the organic matter in the soil, producing a black, thick soil solution. The soil consequently develops a blackish colour, hence the name black'alkali'. Such an unhealthy soil can be reclaimed by application of gypsum and by leaching out the salts by frequent applications of irrigation water. Incorporation of a large amount of green leafy matter will also be helpful (For further details please refer to our article "Reclamation of Alkaline Soils" in our previous issue.)

Question No. 7.

What is the correct method of preparing the important fungicide Bordeaux Mixture?

Answer:

A standard solution of Bordeaux Mixture must contain 5 lbs. of copper sulphate and 5 lbs. of quick or burnt lime in 50 gallons of water (5-5-50 formula). Powder the copper sulphate and wrap it in a piece of cloth or gunny and immerse it in 25 gallons of water. Soon the copper sulphate will have dissolved. Place the 5 lbs. of quicklime in another tub and add a little water. Go on adding water little by little till a thick paste free

from lumps is formed. Then add the rest of the 25 gallons of water and stir it well. Pour the copper sulphate solution and the milk of lime together *simultaneously* into a third barrel, all the while stirring vigorously. The ultimate mixture will have a sky blue colour. To test the mixture, dip the polished blade of a knife into it. No copper should be deposited on the iron blade. If you see a reddish brown deposit add more milk of lime.

The Bordeaux Mixture thus prepared is an effective fungicide and can be used for such fungus diseases of plants as the Mahali disease of arecanut, the mildew of grapevine, the die-back of oranges, the fruit-rot disease of chillies, the leaf spot of ginger and turmeric, the early-blight of potato, etc.

If the Beredaux Mixture is to be used during monsoon rains it will be advisable if a little adhesive is added to it, so that it may not be readily washed off by heavy rains. The best adhesive is a mixture of washing soda (2 Lbs.) and powdered resin (4 Lbs.) First dissolve the soda in 2 gallons of water and boil it. Then add the resin little by little, taking care that the solution does not boil over. Boil it for an hour, stir vigorously and then add it to the Bordeaux Mixture.

Question No. 8.

Can you recommend a corrective measure against the leaf blight disease of cocoanut palm?

Answer:

This particular disease is caused by a fungus, called, "PESTALOZZIA PALMARUM". The disease starts with the appearance of minute yellow spots on the leaflets of the older leaves. These spots soon enlarge into irregular patches and the affected parts die out, turning white ultimately. This disease is met with, in almost all the cocoanut growing regions. Generally these Night diseases are the sure sign of the ill health of the trees, brought about by soil deficiencies and inadequate manuring. Good cultiva tion and proper manuring will put an end to these diseases. If this fungus attacks nursersies and young plantations it may cause serious damage. The control measures consist in cutting out the infected portions and burning them on the spot. The unaffected leaves must be given a protective spray of Bordeaux mixture to which an adhesive (as mentioned earlier) is added. Such a spray will enable the young trees to ward off fungal infection.

NEWS & NOTES..........in brief

PUBLICITY BUREAU FOR AGRICULTURAL RESEARCH

Mr. Jairamdas Daulatram, the Food Minister, recently disclosed in Parliament that the Government were actively considering the establishment of an Information Bureau under the Indian Council of Agricultural Research. The Bureau will be responsible for undertaking inter-alia the collection and collation of technical information and knowledge for answering enquiries pertaining to matters concerning agricultural and animal husbandry and for disseminating the results of researches which were capable of practical application in the farmer's fields. Besides, it will also provide facilities for training agricultural graduates and officers from the various Provinces, States and Centrally administered areas in the art of propaganda and dissemination of practical knowledge to help in narrowing down the existing gulf between research and its practical application.

U. N. O. REPORT ON ECONOMIC AFFAIRS

ON FOOD PRODUCTION

Sir John Boyd Orr, Chairman of the U. N. Food Council recently sounded a note of warning that the increase in the world's population and the decrease in fertile lands were "as great a threat to human society as the atomic bomb." According to the United Nations Economic and Social Council Report the total world food production fell 7% in 1947–48 compared with that in prewar years but the population increased by 200 millions. Regarding the food position in India and Pakistan the report says "The production of wheat in India is about three-quarters of a million tons under the previous year's, and production of rice is about two and a half million tons lower. It is doubtful if the entire decrease in rice production can be offset by increased imports; with the decline in wheat production India will need to import a minimum of two million tons more breadgrain than during the previous years to maintain the present low cereal consumption.

ON INDUSTRY

In India, great interest is taken in development planning, and the Dominion Government have plans for railway, highway and industrial development. An Advisory Planning Board was created in 1946. The Goverment are planning to undertake and operate many large hydro-electric projects, such as the Damodar Project and a large Government owned artificial fertiliser factory is understood to be nearing completion. Provincial Governments of the Dominion of India also have many plans. Emphasis in all Indian plans is on industrial and power development although plans for development of communications, literacy and hospitals also occupy a prominent place.

Information relating to India and Pakistan indicates that the plans of the Central and Provincial Govts. will involve about 5,000,000,000 dollars. Electrical development, railway, roads, agriculture and education, in that order will account for the greatest expense.

Also included in the plans is the annual production by 1952 of an additional 3,000,000 tons of food-grains.

The Dominion of Pakistan is in a stronger position agriculturally than the Dominion of India. Further, its jute and tea exports are expected to strengthen its balance of payment position. On the other hand, Pakistan has less than a proportionate share in the sub-continents' industries and coal deposits. Although it is too early to determine the main lines of development-planning in Pakistan, it is certain that development of hydro-electricity will play a crucial part.

QUALITY CONTROL IN INDUSTRY

The seven-day conference on standardisation and quality control at Calcutta organised by the Indian Statistical Institute and the Indian Standards Institution has meant much for the promotion of quick and efficient industrial production in India. The conference was really fortunate to have as its president, the American Quality Control Expert, Dr. Shewhart, who is the founder of the quality control technique and one of the major executives of the World's biggest research organisation, the Bell Telephone Laboratories.

In his presidential address, Dr. Shewhart laid special emphasis on the importance of the science of statistics to various industries. Taking India's food problem, as an instance, he said that increased production of food involved the use of fertiliser, which in turn meant machinery and equipment. Importance of quality and maintenance of proper standards were essential in integrating different branches of production. India could not develop her vast resources unless science laboratories and industrial concerns worked together and quality control would enable them to do this. It may be quite possible, he added, that India may be able to build the machinery for her essential industries as she was rich in her resources.

I. C. S. I. R. ANNUAL MEETING

South India to have the sixth national laboratory for Electro-Chemical Research.

At the annual meeting during the first week of February '48, the Governing Body of the Indian Council of Scientific and Industrial Research have taken several important decisions regarding the development of Scientific Research in India. Important among these is the setting up of a committee to work out details of a scheme for the establishment of an industry for manufacturing synthetic petrol from coal. Second and third grade qualities of coal will be utilised for the production, thus saving the limited supplies of first grade coals. Arrangements have been already made for testing in America of Indian coals for their

suitability for the manufacture of synthetic petrol. Simultanequs with the manufacture of synthetic petrol, the council recommended to Government, intensified geological and geophysical exploration of possible areas of occurrence of petroleum in India. Crude petroleum may also be brought from the Iranian and Burma oil fields and refined at two or three stations in India. A statutory cess of half anna per ton on coal despatched in India should be levied to aid fuel research in the country.

The Council has further decided to establish an Electro-Chemical Research Institute in South India which will be the sixth in the chain of India's National Laboratories. The donation of Rs. 15 lakhs by Dr. Alagappa Chettiar is to be utilised for this purpose. With a well-developed electricity system and a growing Chemical Industry, South India affords a suitable venue for Electro-Chemical Research. It is highly necessary that industrialists should continue to associate research with their processes of production if they have to attain industrial standards of a cadre attained in advanced western countries.

MANUFACTURE OF PHOSPHORUS

In a non-technical note published in the Journal of Scientific and Industrial Research, some details are given for the manufacture of phosphorous in India. We give below relevant extracts from the same.

Demand for the amorphous red phosphorus in this country has risen considerably from a previous consumption of 150 tons per annum, to a range between 200 and 250 tons. There is bound to be a spurt in the demand for the amorphous phosphorus, if the contemplated development schemes in the match and non-ferrous metallurgy industries, its principal consumers, fructifies. A plant with a manufacturing capacity of 300 tons promises to make a sound business proposition in that both the raw materials and equipment are readily available in this country. A 1500 KVA furnace transformer, the important item of the plant, can be easily fabricated in this country.

The process in brief consists in mixing Rock phosphate containing 55% calcium phosphate with 40% of its weight of silica and 20% of its weight of charcoal and feeding it into an electric furnace. Phosphorous fumes evolved are cooled in a train of surface cooled condensers with a spray absorber at the end of the train. The product is collected under water and purified with Sulphuric Acid and Dichromate.

From the results obtained in the pilot plant at the Indian Institute of Science at Bangalore it is estimated that for producing one pound of white phosphorous, 20 lbs. of mixed charge and 12'5 K. W. H. of energy will be required.

"GROW MORE VEGETABLES" DRIVE IN U. K.

With an ever-growing trend towards vegetarianism in diet,

British people are beginning to think of vegetables as a base instead of adjuncts of a meal. It becomes worth-while therefore to apply scientific methods to the growing of such goods.

With this object in view, the British Ministry of Agriculture has established a research station where teams of scientists are working in co-operation with growers who will for the first time in history, under Government auspices apply science to methods of vegetable-growing. New varieties will be raised and the experts will aim to ensure that only the best varieties are cultivated. This means research into soil fertility and the suitability of packing and distributing of produce.

It is expected that Britain will within a few years, be producing the best vegetables and the largest crops in the world.

MAHATMA GANDHI HYDRO-ELECTRIC WORKS

The switching of power from the Jog Works which was christened as "Mahatma Gandhi Hydro-Electric Works" by the Maharaja of Mysore on the 21st of February 1948 marks an important landmark in the economic development of Mysore. The Hydro-Electric Works has been designed without in any way interfering with the majestic glory of the Jog Falls. The immediate need for the works arose out of the continued progress in the industrial activities of the State in recent years.

A storage reservoir of 25,000 million c. ft. capacity has been constructed by building a dam across the river at Hirebhasgar, 13 miles upstream of the Falls. The regulated water of the river from the Hirebhasgar dam flows through the natural course of the river for a distance of about ten miles and here an anicut and necessary head works have been constructed for the purpose of drawing off a regular supply of water into the power channel. The power channel takes off from the left bank of the river at the anicut. Towards the tail-end of this channel a reservoir known as the Sirur Balancing Reservoir has been constructed to ensure the necessary diurnal storage of the generating station.

Two of the four turbine-driven generators installed in the station are now ready for service with a capacity of 24,000 K.W. The erection of two other generators at Jog is expected to be finished within the next few months and thus bring to completion the first stage of Jog Power Scheme. The second stage of extension provides for the installation of four additional generators of 18,000 K.W. thus bringing the total capacity of the Jog Generating Station to 120,000 K.W. The generation of power is to be beneficial to the neighbouring Provinces of Bombay and Madras.

FACTS THAT INTEREST

ANALYSIS OF PHOTOSYNTHESIS-A STEP TO SYNTHETIC FOOD.

Hailed as one of the outstanding scientific developments in modern times, scientists have discovered the first step in the complicated and puzzling production process by which plants transform carbon dioxide gas and water vapour in the air into sugar and starch under the influence of sunlight.

All vegetation on which men and animals live is carbon dioxide in the form of cellulose, sugar and starch. Since the soil does not contain carbon, it was a mystery as to how carbon dioxide in the air was extracted by the plants. The mystery has been explained by American scientists by observing the results produced by feeding the plant with radio-active carbon. 'Their findings disproved that at first chlorophyl, the "green" blood of plants, is formed and then somehow sugar and starch. They discovered that plants use carbon dioxide for two distinct purposes: (1) respiration (2) photosynthesis.

Photosynthesis starts, after an exposure to sunlight of as little as 30 seconds, with a new, hitherto unknown, not yet analysed but indispensable substance which might hold the *key to either producing synthetic food or harvesting more natural food by incre sing artificially the efficiency of photosynthesis.*

Tests were carried out to find out how a single acre of corn (maize) was extracting a total of 11 tons of carbon dioxide from the air. For this, low forms of plant life (single-cell organisms known as algae) were fed with radio-active instead of inert carbon. They were then separated, into three chemical fractions; one water-soluble, one soluble in benzene, and one insoluble. It was found that the water-soluble fraction containing less than two per cent of the algae's dry weight, hoarded almost all of the carbon, apparently in the form of an intermediate substance, an early rather than final product of photosynthesis. Chemical analysis established that this key intermediate substance is neither formaldehyde nor sugar, starch or any organic acid found in plants. It is completely stable in the dark and is not affected by respiration. But further exposure to light transforms it into sugar; thus it is clearly an intermediate in the formation of sugar.

By contrast, the carbon dioxide absorbed by respiration is active in the dark and easily transformed by the metabolic react ions needed to sustain the life of the plant itself. The intermediary product is the stuff which might turn out to be capable of easy and cheap synthesis, as a first step to synthetic food.

ISOTOPES AID AGRICULTURE.

Reports on the use of radio-isotopes in bringing about chemical and

bio-logical solutions to problems involving plant-killing chlorosis, soil fertility and the nutritive deficiencies of cattle are available from the proceedings of the conference held recently in America in connection with the application of atomic energy to the field of Agricultural Research. The great potency of radio-isotopes as unparalleled tools of investigation on problems involving the transformation of atoms and molecules has been emphasised by the conference. Since the radio-isotopes are radio-active, and can be detected throughout any chemical reaction and bio-logical cycle, it has been possible to use them as "tracers."

The causes of chlorosis, which kills green pigments, were assumed to involve a disturbance in the absorption of iron. Radio-sotopes were used to study the interrelationship of iron and phosphorus in chlorosis and tests showed that presence of phosphorus interefered with the uptake of iron. The problem was thus to assess the phosphatic fertility of soils and to recognise when fertilisers could be economically used. Where most soils had inherently moderate or low fertility levels with regard to phosphate, the need arose to the correct use of fertiliser in its rate, time and placement of application. Radio-active phosphate used as a "tracer" gave an entirely new approach to the problem of fertiliser placement, degree of utilization and relative availability of various fertilisers.

SEAWEED AS FERTILISER.

The Scottish Seaweed Research Association is examining the possibilities of scientific and economic exploitation of seaweed. Inquiries are directed to discover the food value and digestibility of seaweed as fodder for sheep, pigs and poultry. In addition further use is made of seaweed as a fertiliser. Expert opinion also guides to show that seaweed from Scottish coasts could yield chemicals.

One of the salient secrets that laboratory tests have un-coverted is that one particular seaweed extract when mixed with a metal can be spun like cellulose into a form of rayon. Of great strength and lustre, this alginate rayon is entirely fire-proof and water-proof. Algin possesses properties rather like cellulose. If treated with tannin and caustic soda, transparent paper with a texture cellophane results. Treated with a vulcanising agent, it yields a rubber-like material which is now used to make typewriter rollers.

MECHANIZED CHESS.

About a year ago, Lord Mountbatten stirred up a minor hornets' nest by his discussion, widely quoted and even more widely misconstrued, on the potentialities of what he called the "electronic brain"

One of the examples which he instanced was that it might even be possible to design a machine which would play chess.

It is understood that a young mathematician in the Bell Telephone Laboratory is actually at work on such a device.

The preliminary mathematical investigation is stated to have been completed, and consideration is now being given to the types of circuit which could best be used to give effect to the results.

It is just possible, if its designer is as good a chessplayer as a mathematician, that this robot device might be able to look more thoroughly into future possibilites than could the average good player at any reasonable rate of play. But it may be that not even the most ingenuous of machines can exercise judgment or "intelligence" beyond the framework of rules and instructions which its designer has provided.

SCIENCE OF ULTRASONICS-STRANGE NEW USES OF SOUND.

Fascinating developments in the young science of ultrasonics, using sound waves-as a source of energy are reviewed in an article by Harland Manchester in the "Atlantic Monthly." Sound has become a tool with great potentialities in science, industry, agriculture and medicine. Sound waves of various types will burn your finger, kill bacteria, destroy tissue, homogenize milk, speed chemical reactions, locate submarines, detect flaws in metals, mix paint and precipitate dust particles from smoke. The new tool has been already put to work in a number of practical jobs, and half a dozen firms are rapidly adopting it to an amazing variety of uses. In Russia and in Connecticut, plant seeds stimulated with silent sound waves have producd sensational yields.

The common laboratory method of generation of ultrasonic waves is to pass high-frequency alternating currents through a quartz crystal, making the crystal expand and contract hundreds of thousands of times a second thus causing ultrasonic virbrations. You cannot perhaps see the crystal expand or contract but their vibrations are not strong enough to get results when beamed through the air.

Speeding Plant Growth.

Russian scientists have treated plant seeds with ultrasonic waves and have reported sensational increases in yield. Potato and pea seeds were treated from two to five minutes with sound vibrating 40,000 times a second. The potatoes flowered a week or so earlier than "control" plants and obtained an increase in yield of 40 to 50 per cent. Peas sprouted earlier, produced twice as many pods and in some cases tripled their crop yield. Field experiments with sound-treated seeds of various plants were conducted by Mr. Wallace of Connecticut University and favourable results have been obtained. The possible effects of this development upon the world's food production are obvious. No one knows why ultrasound waves should increase plant yield, but it is pointed out that they can either stimulate or destroy, depending on dosage, power, wavelength and the method of treatment.

FACT NEWS

WOOD CONVEYOR

Among the successful attempts to bring down the cost of production in FACT, is the installation of the mechanical wood handling system—the conveyor. Besides reducing the accident rates this system is found to be capable of handling the wood from the river bank right into the generators at a considerably reduced cost.

The wood is moved up the system by flights attached to the main conveyor chain. Worked by built-in geared head reduction motors, the whole system is automatic. The operator at the upper charging platform of the gas generating plant retains full control of the conveyor at all times. Emergency switch buttons are provided for safety.

The log slasher used here is one of the largest group saws in India having a capacity of about 30 tons per hour. The object of the saws is to reduce the logs of various lengths to a common 18″ length so as to facilitate proper feeding of the generators.

The length of the conveyor from the Log Slasher installed on the bank of the river to the producer gas plant is about 750′.

ELECTROSTATIC PRECIPITATOR (*See Photographs*)

Another useful addition is the fabrication of an electrostatic precipitator for further purification of the gases, nitrogen and hydrogen. It is worthy of note that the equipment was designed and built by Mr. H. G. Felio entirely with materials available locally.

The equipment consists of a Precipitator, high tension transformer and a rectifier unit having a continuous rating of 42,000 Volts, 37 milli-ampere direct current.

F. A. C. T. CO-OPERATIVE SOCIETY LTD. 2700

Correct figures have been received regarding the amount of sales made by the Society from December 1947 and they are given below. The usefulness of the Society in meeting the needs of the employees can be gathered therefrom.

MONTH		AMOUNT OF SALES		
		RS.	AS.	PS.
December 1947	...	13,853	15	1
January 1948	...	12,481	14	5
February 1948	...	13,266	8	1

SPORTS

Thanks to the bulldozer and the wholesome welfare-mindedness, a foot-ball ground and two tennis courts have been laid in the quickest possible time, thus increasing the amenities for recreation of the employees. The tennis courts were formally opened by Sri V. Seshasayee on the 16th of February.

DISTINGUISHED VISITORS

H. E. Rt. Rev. Dr. Jose Alvernes Ph. D. D., D. C. L., S. S. C. D., the Bishop of Cochin and Rev. Father Jose Chiramel, Founder Director, St. Philomena's Shrine, Chullical, Cochin, visited the factory on the 10th of February.

FAREWELL

What L. C. M, and H. C. F. are to Arithmetic, that Mr. L. C. McCarty and Mr. H. G. Felio have been to FACT—as important and fundamental. As members of the Intercontinent Corporation of America, they have been the pioneers of two of the vital industries for India—The Hindustan Aircraft Ltd., at Bangalore and the Fertilisers & Chemicals Travancore Ltd., at Alwaye. To have successfully accomplished the construction of two such big factories in record time is indeed an achievement of which they can be legitimately proud of.

Speed is a national trait of America. And it is by comparison that one properly realises its significance. Here is an extract from "DITCHER'S DIARY" from "CAPITAL." "As a stimulus to production, a British aircraft concern and a U. S. aircraft company agreed to see which could build an aeroplane the quickest. They were to be identical machines and both firms were to begin work on the same day, a Monday. On the following Thursday the British firm received a cable from the U. S. Company:- "Only three more bolts to fit, and we shall be finished." The British company replied "only three more forms to fill in and we shall have started." Mr. L. C. McCarty and Mr. Felio proved in FACT this characteristic of the Americans.

In spite of the several trying circumstances due to the Second World War and the strike situation in the United Kingdom and U. S. A. which delayed the arrival of the machinery and equipment by several months, the untiring energy of Mr. McCarty and Mr. Felio, put our Fertiliser Plant on trial production by July 1947. This is an achievement which will be remembered not only by FACT and Travancore but the whole of India as well, coming as it does at a time when the world is trying to solve the problem of hunger and its satisfaction.

On the 18th of February 1948, on the eve of the departure of Mr. and Mrs. L. C. McCarty (Junior) and Mr. H. G. Felio from FACT a farewell party was arranged. The function was attended by the Management and the senior staff of the factory.

Tributes were paid to the qualities of head and heart of the guests and references were made to the great contribution of Messrs McCarty and Felio in bringing FACT to the present stage of activity.

We are glad to learn that Mr. L. C. McCarty is going to be associated with the construction of a new Aircraft factory in America. We wish him all success in his new venture. We hope to see Messrs McCarty and Felio back again in India to make further contribution to the cause of Industrialisation in India

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We also miss from our midst Mr. A. N. S. Iyengar, ex-Editor of FACT Magazine. We wish him all success in his future endeavours.

കേരളത്തിലെ കർഷകൻ

By

രവീന്ദ്രൻ നാകപ്പാടി ബി. എ.,
F. A. C. T. അക്കൗണ്ട്സ് ഡിപ്പാർട്ട്മെൻറ്.

കലപ്പയും തോളിലേന്തി കാളയുടെ പിമ്പെ നടന്നുപോകുന്ന കേരളത്തിലെ കർഷകനെ നിങ്ങൾ സൂക്ഷിച്ചിട്ടുണ്ടോ? ഒട്ടിയ കവിൾത്തടങ്ങളും, കുഴിഞ്ഞ കണ്ണുകളും, ശുഷ്കിച്ച മാംസപേശികൾ എഴുന്നുനില്ക്കുന്ന ശരീരവും എല്ലാമൊത്ത ആ അസ്ഥിമാത്രൻ ദാരിദ്ര്യത്തിൻെറ പ്രതിരൂപമാണ്. എന്നാൽ മൂന്നുനാല തലമുറകൾക്കു മുമ്പ് അവനു് ആരോഗ്യത്തിൻെറയും സമൃദ്ധിയുടെയും പ്രതിരൂപമായിരുന്ന ഒരു കാലമുണ്ടായിരുന്നു.

രക്തപ്പുഴകളിൽക്കൂടി– വിപ്ലവ തീച്ചൂളകളിൽക്കൂടി– ലോകം നിരവധി ദൂരം പുരോഗമിച്ചു. എന്നാൽ കേരളത്തിലെ കർഷകൻ അവൻെറ പഴയ നില വിട്ടിട്ടില്ല. ശാസ്ത്രം തൻെറ കണ്ണഞ്ചിക്കുന്ന പ്രകാശം ലോകം മുഴുവൻ വിതറി. എങ്കിലും കേരളത്തിലെ കർഷകൻെറ കണ്ണുതെളിക്കുവാൻ അതിനിനിയും കഴിഞ്ഞിട്ടില്ല. കാലത്തിനനുസരിച്ചുള്ള കോലം കെട്ടുവാൻ കഴിവില്ലാതെ പോയതുകൊണ്ടാണ് അവനിതുമാത്രം കഷ്ടപ്പാടുകളുമായി കഴിയേണ്ടിവന്നതു്.

ചേരമാൻപെരുമാളിൻെറ കാലത്തു് നിലവിലുണ്ടായിരുന്ന കൃഷിസമ്പ്രദായങ്ങളാണു് ഇന്നും ഇവിടെ തുടരുന്നതു്.

പാശ്ചാത്യരാജ്യങ്ങളിൽ യന്ത്രക്കലപ്പകൊണ്ടു് നിരവധി ഏക്കറുകൾ അവിടത്തെ കർഷകൻ ഉഴുതുമറിക്കുമ്പോൾ, നമ്മുടെ നാടൻകൃഷിക്കാരൻ അൽപ്രാണികളായ രണ്ടു കാളകളെ പൂട്ടിയ മരക്കലപ്പകൊണ്ടു് കഷ്ടിച്ചു് പത്തു സെൻറു് സ്ഥലം ഒന്നിളക്കിയിടുന്നു. അതും കൊടുംവെയിലത്തു നിന്നു് പൊരിഞ്ഞുകൊണ്ടാണു്. യന്ത്രീകൃത ഫാക്ടറികളിൽ ഉണ്ടാക്കിയ കൃത്രിമവളങ്ങൾ പാശ്ചാത്യകർഷകൻ തൻെറ വിളഭൂമിയിൽ വിതറുമ്പോൾ, മുട്ടക്കുന്നുകളിലെ കുററിക്കാടുകൾ വെട്ടിയ പച്ചച്ചവർ നാടൻകർഷകൻ തലച്ചുമടായി പാടത്തേക്കു് ചുമക്കുന്നു. വൈദ്യുതയന്ത്രത്തിൻെറ ഒരു സ്വിച്ചിടുമ്പോൾ അരനാഴികകൊണ്ടു് അവിടത്തെ വയലുകളിൽ വെള്ളം നിറയുന്നു. കേരളത്തിലെ സാധു കൃഷിക്കാരനാകട്ടെ രാത്രി മുഴുവൻ ഉറക്കമിളച്ചു നിന്നുകൊണ്ടു് വയലിലേക്കു് ത്‌ലാവിട്ടു് തേവുന്നു. ചരാചരങ്ങൾ മുഴുവൻ നിദ്രയിൽ ലയിച്ചിരിക്കുമ്പോൾ, അർദ്ധരാത്രിയുടെ നിശ്ശബ്ദതയെ തഴുകിക്കൊണ്ടു് അവൻെറ തേക്കുപാട്ടു് ആലാപിക്കുന്നു—വികാരനിർഭരമായ ഒരു ശോകഗാനംപോലെ രാത്രിയും പകലും ഭേദമില്ലാതെ, മഴയും മഞ്ഞും നോക്കാതെ മൃഷ്ടാന്നമാണെങ്കിലും പട്ടിണിയാണെങ്കിലും നിരന്തരം അദ്ധ്വാനിച്ചിട്ടും ദാരിദ്ര്യ

ത്തിൽനിന്നും രക്ഷപ്പെടുവാൻ സാധിക്കാത്ത കേരളത്തിലെ കൃഷകൻ ദുരിതത്തിന്റെ ഒരു പ്രതിരൂപമാണു്; മനുഷ്യനീതിയുടെ നേർക്കുള്ള ഒരു ചോദ്യചിഹ്നമാണു്.

കൃഷകന്റെ അവശതകൾ ഏറിയകൂറും സാമ്പത്തികമാണു്. പലപ്പോഴും താങ്ങാൻ കഴിയാത്തവണ്ണം അവൻ ഋണബാധിതനാണു്. ഈ മഹാവ്യാധിയിൽനിന്നും അവനെ രക്ഷിക്കുവാൻ പരസ്പരസഹായ സംഘങ്ങൾ നാടെങ്ങും വളൎന്നുവരേണ്ടിയിരിക്കുന്നു.

കേരളത്തിലെ കൃഷിസ്ഥലങ്ങൾ മിക്കവാറും തീരെ ചെറുതാണു്. തലമുറതോറും ഭാഗിച്ചു്, ഭാഗിച്ചു് നിലങ്ങൾ ഛിന്നഭിന്നമായി തീൎന്നിരിക്കുന്നു. ഉഴുതുകൊണ്ടിരിക്കുമ്പോൾ കാളക്കും കലപ്പക്കും ഒന്നു തിരിയാൻ സാധിക്കാത്ത വിധത്തിൽ അത്രക്കു് വീതികുറഞ്ഞ നിലങ്ങൾ ധാരാളമുണ്ടു്. ഇത്തരം ചെറിയ തുണ്ടങ്ങൾ അവിടവിടെയായി രണ്ടും മൂന്നും ചിലപ്പോൾ അതിലധികവും ഒരാൾക്കു് കണ്ടെന്നും വരാം. ഇവ തമ്മിലുള്ള അകലം വളരെ അസൗകൎയ്യങ്ങൾ ഉണ്ടാക്കുന്നു. ഇത്തരം ചെറിയ നിലങ്ങൾ തമ്മിൽ യോജിപ്പിക്കുന്നതിനു് പഞ്ചാബിലെ ഗവൺമെന്റു് അവിടത്തെ കൃഷകൎക്കു് സൗകൎയ്യം ചെയ്തുകൊടുക്കുകയുണ്ടായി. തൽഫലമായി ഗണ്യമായ അഭിവൃദ്ധിയുണ്ടായി എന്നുള്ളതു് പ്രസ്താവ്യമാണു്. കേരളത്തിൽ സഹകരണാടിസ്ഥാനത്തിലുള്ള ഒരു കൂട്ടു കൃഷിസമ്പ്രദായം വളരെ പ്രയോജനകരമായിരിക്കുമെന്നു് പ്രതീക്ഷിക്കുവാൻ ന്യായങ്ങളുണ്ടു്. വിസ്താരമേറിയ കൃഷിസ്ഥലങ്ങളിൽ മാത്രമേ ശാസ്ത്രീയമായ കൃഷിസമ്പ്രദായങ്ങൾ ആദായകരമായ വിധത്തിൽ ഏൎപ്പെടുത്തുവാൻ സാധിക്കയുള്ളു.

നമ്മുടെ നാട്ടിലെ കാൎഷികോപകരണങ്ങൾ പരിഷ്കൃതമായ ഏതു രാജ്യത്തും കാഴ്ചബംഗ്ലാവിലെ പ്രദൎശന സാമഗ്രികളായി മാത്രമേ ഉപകരിക്കയുള്ളു. ഈ വിഷയത്തിൽ ശാസ്ത്രം നേടിയിട്ടുള്ള ഗംഭീരമായ പുരോഗതി ചെറിയ തോതിലെങ്കിലും ഇവിടെ പകൎത്തേണ്ടതു് അത്യാവശ്യമാണു്.

കൃഷിക്കു് അവശ്യം വേണ്ടിവരുന്നതു കഴിച്ചു് ബാക്കി വരുന്ന സമയം ആദായകരമായി വിനിയോഗിക്കുവാൻ വേണ്ട സൗകൎയ്യങ്ങൾ കൃഷകനെ സംബന്ധിച്ചിടത്തോളം വളരെ അത്യാവശ്യമാണു്. കന്നുകാലി വളൎത്തൽ, കുടിൽ വ്യവസായങ്ങൾ ആദിയായ കാൎയ്യങ്ങൾ വളരെ ത്വരിതഗതിയിൽ ഇവിടെ വളരേണ്ടിയിരിക്കുന്നു.

വൻതോതിലുള്ള ജലസേചന പദ്ധതികൾ നടപ്പിലാക്കിയും ഉപകരണങ്ങൾ, ശാസ്ത്രീയമായ വളങ്ങൾ, വിത്തുവകകൾ ആദിയായവ, വേണ്ടിവന്നാൽ കടമായി തന്നെ കൊടുത്തും ഗവൺമെന്റു് തന്നെ കൃഷകനെ സഹായിച്ചേ മതിയാകൂ. ലോകമെങ്ങും മനുഷ്യസമുദായം പട്ടിണിയുമായി ഒരു ജീവൻമരണ സമരത്തിലേൎപ്പെട്ടിരിക്കുന്ന ഈ വിഷമഘട്ട

ത്തിൽ കാഷികപ്രശ്നങ്ങളുടെ നേരെ അനാസ്ഥ പ്രകടിപ്പിക്കുകയാണെങ്കിൽ അതു് കുററകരമായ നിരുത്തരവാദിത്വമായിരിക്കും.

ഈ വിഷയത്തിൽ തിരുവിതാംകൂർ ഗവൺമെൻറു് ഉണർന്നുകഴിഞ്ഞിരിക്കുന്നു എന്നറിയുന്നതു് എത്രയും ചാരിതാത്ഥ്യ ജനകമാണു്. ഉത്തര തിരുവിതാംകൂറിൽ വടക്കു ചാലക്കുടി ആററിനും തെക്കു മൂവാററുപുഴ ആററിനും മദ്ധ്യേ സ്ഥിതിചെയ്യുന്ന ഉദ്ദേശം ഒരു ലക്ഷത്തിഇരുപതിനായിരം ഏക്കർ സ്ഥലത്തു് മുടക്കംകൂടാതെ നെൽകൃഷി നടത്തുന്നതിലേക്കു മതിയായ ജലസേചന സൌകര്യങ്ങൾ ചെയ്യണമെന്നുള്ള ഉദ്ദേശത്തോടുകൂടി ഗവൺമെൻറിൽ നിന്നും താഴെപ്പറയുന്ന വ്യവസ്ഥകൾ അനുവദിച്ചിരിക്കുന്നതായി ഒരു പ്രസ്സ്നോട്ടിൽ പ്രസ്താവിച്ചിരിക്കുന്നു.

1 പെരിയാററിൽ നിന്നും മൂവാററുപുഴയാററിൽ നിന്നും വിവിധസ്ഥലങ്ങളിൽ വച്ചു് വിദ്യുച്ഛക്തിമുഖേന വെള്ളം പമ്പുചെയ്തു കയററുകയും പിന്നീടു് അതു തോടുകൾവഴിയായി വയലുകളിലേക്കു് വിടുകയും ചെയ്യണം. ഈ പദ്ധതി മുഴുവൻ ഗവൺമെൻറിൻെറ ഒരു ജലസേചന സിസ്ററത്തെ അടിസ്ഥാനപ്പെടുത്തിയും, സ്ഥലത്തിൻെറ വിസ്തീർണ്ണം കണക്കാക്കി കഷകരിൽ നിന്നും ഒരു ജലസേചനനികുതി ഈടാക്കുന്നതിനുള്ള വ്യവസ്ഥയോടുകൂടിയും ആയിരിക്കുന്നതാണു്.

2 ഇറിഗേഷൻ പദ്ധതിയുടെ മുഴുവൻ ചാൎജ്ജു് സ്വന്തം ജോലിക്കുപുറമെ ആലുവാ എക്സിക്യൂട്ടീവു് എൻജിനീയർ വഹിക്കുന്നതാണു്. അദ്ദേഹം ലാൻഡു് കമ്മീഷണരുടെ നിർദ്ദേശവും, നിയന്ത്രണവും അനുസരിച്ചു് പ്രവൎത്തിക്കുന്നതും ആയിരിക്കും.

3 ഈ പദ്ധതി കഴിവുള്ളത്ര വേഗത്തിൽ നടപ്പിൽ വരത്തക്കവണ്ണം ആവശ്യമുള്ള വിദ്യുച്ഛക്തിയും പമ്പുകളും എലക്ട്രിക്കൽ എൻജിനീയർ സപ്ളൈ ചെയ്യുന്നതാണു്.

പ്രസ്തുത പ്രദേശത്തു് ഉദ്ദേശം 4500 ഏക്കർ സ്ഥലം അടുത്ത പുഞ്ചകൃഷിക്കു് ഉപയോഗപ്പെടത്തക്കവണ്ണം ഈ പദ്ധതി ഉടൻതന്നെ നടപ്പിൽ വരുത്തുന്നതാണു്. മുഴുവൻ പ്രദേശത്തെയും, സംബന്ധിച്ചുള്ള ദീർഘകാലപദ്ധതി രണ്ടുകൊല്ലത്തിനകം പ്രയോഗത്തിൽ വരുത്തേണ്ടിയിരിക്കുന്നു. ഈ പദ്ധതിയുടെ ഫലമായി കൂടുതൽ ഉണ്ടാകുന്ന വിളവു് ഒരു കോടി പറ നെല്ലിലധികമായിരിക്കുമെന്നു് കണക്കാക്കപ്പെട്ടിരിക്കുന്നു.

ഭക്ഷ്യോല്പാദനപദ്ധതിയുടെ കാര്യക്ഷമമായ പ്രവൎത്തനങ്ങൾക്കുവേണ്ടി ഗവൺമെൻറു് അടിയന്തിരാധികാരനിയമം അനുസരിച്ചു് ലാൻഡു് കമ്മീഷണൎക്കു ചില വിശേഷാൽ അധികാരങ്ങളും നല്കീട്ടുണ്ടു്.

എഴുത്തുപെട്ടി.

ചോദ്യം 3:— ഫലോല്പാദകങ്ങളായ ചെടികൾക്ക് ഉപയോഗിക്കേണ്ട അമോണിയം സൾഫേററിന്റെ അളവ് എത്രയാണ്?

ഉത്തരം:— (a) ഫലദായകങ്ങളായ ചെറിയ ചെടികൾക്ക്, അതായതു്, ടൊമാറെറാ, വഴുതന, വെണ്ട, മുളക് മുതലായ ചെടികൾക്ക് ഒരു ചതുരശ്രഗജം സ്ഥലത്തിന് ഒന്നു മുതൽ രണ്ട് ഔൺസുവരെ സാധാരണമായി അമോണിയം സൾഫേററ് ഉപയോഗിക്കാം. പൂച്ചെടികൾക്ക് ഉപയോഗിക്കുന്ന രീതിയിൽ തന്നെയാണ് ഇവയ്ക്കും സൾഫേററ് ഉപയോഗിക്കേണ്ടതു്. ആ ചെടികൾ അവയുടെ പൂർണ്ണവളർച്ചയെ പ്രാപിച്ചുകഴിഞ്ഞാൽ പിന്നെ ഓരോ ചെടിയുടെ ചുററും മണ്ണിളക്കിയിട്ട് ഈ വളമിടാം. എന്നാൽ അമോണിയം സൾഫേററ് ഇട്ടുകഴിഞ്ഞാൽ ഉടൻതന്നെ ജലസേചനം അത്യന്താപേക്ഷിതമാണെന്നുള്ള കാര്യം വിസ്മരിക്കാൻ പാടില്ലാത്തതാകുന്നു. അമോണിയം സൾഫേററോടുകൂടി Potassium Sulphate or Chloride, Super phosphate ഇവയും കൂട്ടി ഉപയോഗിക്കുന്നതായാൽ അതു് ഏററവും ഫലപ്രദമായ വളമായിത്തീരുന്നതാണ്.

(b) ഫലോല്പാദകങ്ങളായ വൃക്ഷങ്ങൾക്ക് അവയുടെ വളർച്ചയനുസരിച്ച് 1 റാത്തൽ മുതൽ 3 റാത്തൽ വരെ അമോണിയം സൾഫേററ് ഉപയോഗിക്കാം. ഓരോ വൃക്ഷത്തിന്റെയും ചുവട്ടിൽ ചുററും ഒരു കുഴിയെടുത്തു് അതിൽ ഈ വളം ഇട്ട് മൂടുക. ഇതു മഴക്കാലത്തൊ മഴ തുടങ്ങുന്ന അവസരത്തിലൊ ആയിരിക്കേണ്ടതാണ്. മണ്ണിന്റെ മുകളിലാണിടുന്നതെങ്കിൽ അതിട്ടിട്ട് മണ്ണിളക്കിയിടേണ്ടതാണ്. മാവ് മുതലായ വലിയ വൃക്ഷങ്ങൾക്ക് കൂടുതൽ വളം ഉപയോഗിക്കാം. വൃക്ഷങ്ങൾക്ക് ഉപയോഗിക്കുന്ന കാര്യത്തിൽ പ്രധാനമായി ശ്രദ്ധിക്കേണ്ടതു് വളം തടിയോടു ചേർത്തിടരുതെന്നുള്ളതാണ്. വൃക്ഷങ്ങളുടെ വേരുകൾ അകലെയായിരിക്കുന്നതുകൊണ്ടു് അവയുമായി സമ്പർക്കമുണ്ടാകുന്ന സ്ഥലത്തായിരിക്കണം വളം ഇടുന്നതു്. കൂടാതെ മഴക്കാലത്തുമാത്രമെ അമോണിയം സൾഫേററ് ഉപയോഗിക്കാവൂ.

ചോദ്യം 4:— സാധാരണ കറുത്ത മണ്ണിൽ കൃഷി ചെയ്യപ്പെടുന്ന ചോളത്തിന് അമോണിയം സൾഫേററ് എങ്ങനെയാണ് ഉപയോഗിക്കേണ്ടതു്?

ഉത്തരം:— സീഡഡ് ഡിസ്ട്രിക്ടിലും കോയമ്പത്തൂർ, സേലം, തിരുനൽവേലി, രാമനാഡ് മുതലായ ജില്ലകളിലുമാണ് സാധാരണ കറുത്ത മണ്ണ് കാണാറുള്ളതു്. ഭൂമിയിൽ വളരെ ആഴത്തിൽ ഈ മണ്ണു കാണുന്നു. ഇതിൽ കുമ്മായം ധാരാളമായി കലർന്നിരിക്കുന്നു. അവയ്ക്കു് കൂടുതലായി ഈറപ്പത്തെ വഹിച്ചുകൊണ്ടിരിക്കാൻ സാധിക്കുന്നതിനാൽ ഈ

വളങ്ങളിൽനിന്നും ലഭിക്കുന്ന ആഹാരസാധനങ്ങളെ കൂടുതലായി വഹിച്ചുകൊണ്ടിരിക്കുന്നതിന് അതിൽ കലന്നിരിക്കുന്ന എക്കൽ സഹായിക്കുന്നു. ഈ മണ്ണിൽ കൂടുതലായി പഞ്ഞിമരങ്ങൾ ഉണ്ടാകുന്നതുകൊണ്ട് അവയെ "Black Cotton Soils" എന്നു പറയുന്നു.

ഈ മണ്ണിൽ സാധാരണമായി ഒരേക്കറിനു 2-Cwt: അമോണിയം സൾഫേററ് വീതമാണു് ഉപയോഗിക്കേണ്ടതു്. സാധാരണ സ്ഥിതിഗതികളിൽ ഈ അളവു് മതിയാകുന്നതാണു്. ഇതോടുകൂടി 1-Cwt: Super Phosphate കൂടി ഉപയോഗിക്കാം. അമോണിയം സൾഫേററ് ഉപയോഗിച്ചാൽ ഇതു ചോളകൃഷിയ്ക്കുമാത്രമല്ല, അതിനെ തുടൎന്നു് ചെയ്യുന്ന പഞ്ഞികൃഷിയ്ക്കും, ശരിയായ ഫലം ഉണ്ടാക്കുന്നു. ഈ വസ്തുതകൾ മദ്രാസ് ഗവൎമ്മെൻറ്വക കൃഷിഡിപ്പാൎട്ടുമെൻറ് നടത്തിയിട്ടുള്ള ഗവേഷണങ്ങളാൽ കണ്ടുപിടിക്കപ്പെട്ടിട്ടുള്ളതാണു്. ഈ വളം (അമോണിയം സൾഫേററ മാത്രമോ സൂപ്പർ ഫോസ്ഫേററ കൂട്ടിച്ചേർത്തോ) നിലങ്ങളിൽ വിതരണം ചെയ്തിട്ട് വിതയ്ക്കുന്നതിനു മുൻപായി ഒരു പ്രാവശ്യം ഉഴുതിടേണ്ടതാണു്. അല്ലാത്തപക്ഷം വിതച്ചുകഴിഞ്ഞു് മൂന്നുനാലു് ആഴ്ചകൾ കഴിഞ്ഞു് മുകളിൽ വിതറുകയും ചെയ്യാം.

നന്നായി മണ്ണുവേലയെടുക്കുന്ന ചെറുപ്പക്കാരനെ കണ്ടു്

കൂട്ടുകാരൻ:— "ആഹാ! ഗോപി ഇതുപോലെ പണിയെടുക്കുന്നതു് ഇതിനുമുമ്പു് ഞാൻ കണ്ടിട്ടേയില്ലല്ലോ!"

ഗോപി:— "ശരിയാണു്—പ്രസംഗംചെയ്തു് ജയിലിൽ പോയപ്പോൾ ഇടികൊള്ളുകയും പണിയെടുത്തു പഠിക്കുകയും ചെയ്തു. അതുകൊണ്ടാണു് ഇപ്പോൾമുതൽ വേലയെടുക്കുന്നതു്.

ഭിക്ഷുവിനു് ആഹാരം കൊടുത്തിരുന്ന ഗൃഹനായികയെ കണ്ടു്!

ഭത്താവു്:— കോപത്തോടെ "നീ ഇങ്ങനെ വിലയേറിയ ഭക്ഷണസാധനങ്ങൾ പിച്ചക്കാൎക്കു കൊടുക്കുന്നതെന്താണു്?"

ഭാൎയ്യ:— "അവൻ അതു് കുററം പറയാതെ കഴിക്കുമെന്നുള്ളതിനാൽ തന്നെ."

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ENGLISH

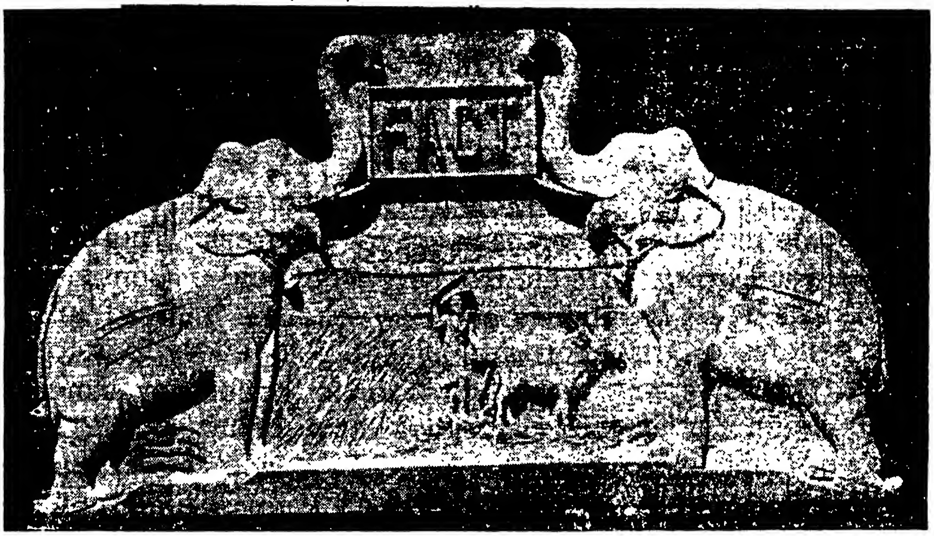
On the Cover Page:—

Sri. PATTOM THANU PILLAI
PRIME MINISTER

In charge of:—

Civil and Criminal; Judiciary; Police; Jails; Law; Administrator-General; Information and Broadcasting; Fine Arts; Land Income tax; Food; Agriculture; Public works; Electricity; Army; Legislation; Accounts and Confidential Sections.

NOTE:— Due to unavoidable circumstances we regret we have been constrained to issue a combined number for March & April 1948.



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EDITORIAL

THE PEOPLE'S MANDATE

It is the privilege of FACT to congratulate the members of the Constituent Assembly on their election to that august body. To the Prime Minister and Honourable Ministers whose leadership the country has acknowledged at the polls, this Magazine and the Industry which it represents extent their felicitations on their assumption of power.

In a period of suffering and shortage, the people have given their mandate to worthy leaders. The people's expectations and needs are many. Chief among these is the amelioration of the food problem which has been and continues to be the main issue facing the country. The Prime Minister's statement that this will bear the first attention of the Ministry is most reassuring.

Self-sufficiency in food is a prime goal to be attained. A country which only produces half its requirements of food

has to make some determined steps to progress in this direction. It is a statistical fact that the production of rice per acre in India is only one-third the Chinese and one-sixth the Spanish cultivation. The difference lies in the availability of water and the application of fertiliser.

The way therefore is clear. Government have already got some irrigation schemes in active progress. There has been good progress in the Lift Irrigation field. Consistent work has to be maintained and new schemes initiated until the benefits of irrigation are available to every possible acre. Money spent in this direction is better investment than the enormous food subsidies now being borne by Government.

The position with regard to fertiliser is easier. The Chemical Industry in Travancore is at present equipped to produce the needs of the land, of well-proved artificial fertilisers. The fifty thousand tons of Ammonium Sulphate and twenty thousand tons of Superphosphate per annum which this plant is equipped to produce are at the disposal of the cultivators of Travancore to double and even treble the productive capacity of their fields. Already the effects of our fertiliser are seen on many smiling fields all over the country.

This Industry is ever ready to assist the Government in any scheme of agricultural development since its first desire and duty is to serve the country in its need. To the Ministry and the people our services stand offered.

Editorial Board.

A NOTE ON

Ammonia Synthesis Industry

BY R. W. RUTHERFORD,
(Director & Technical Manager of the Power-Gas Corporation Ltd., England)

OF all of the very many contracts carried out by The Power-Gas Corporation Ltd. of England, during their long connection with the ammonia synthesis industry, there has probably been none more interesting than the Synthesis Gas Plant erected at Alwaye for The Fertilisers & Chemicals, Travancore Ltd. Their connection dates back some 25 years, to the original ammonium sulphate plant of the Imperial Chemical Industries Ltd. at Billingham in the United Kingdom, since which time the Power-Gas Corporation have become foremost authorities in the world on the subject of synthesis gas production.

In the plant at Billingham, the ammonia synthesis gas is prepared from coke via the water gas process. The first installation built by Power-Gas Corporation in 1923 included 3 gas generators embodying one of the earliest applications of revolving mechanical grates to the water gas process. That first plant was extended from time to time in the late '20s and early '30s, until there were in all 29 Power-Gas Corporation generators. On completion this gas making installation was probably the greatest single installation in the World, and includes several generators which are possibly the largest of their type ever built.

As the demand for ammonium sulphate increased throughout the World, plants were projected and built in many other countries. The Power-Gas Corporation took a leading part in this development, and supplied more synthesis gas making installations in South Africa, Australia, England, China, Holland, Italy, Russia, Japan and Korea. The most recent example of this same type of process, is the large plant now under construction by the Power-Gas Corporation for the Government of India at Sindri, Bihar, which includes 8 large automatic water gas generators of the latest design.

It is interesting to note the rapid progress which was made in the production of synthetic nitrogen fertilisers in Japan between 1923 and 1938, during which time the installed production capacity was increased from something less than one lakh tons of ammonium sulphate per year up to about 20 lakhs tons per year. Incidentally, The Power-Gas Corporation supplied the greatest single share of synthesis gas making plant for all of these Japanese installations.

Everyone is not always so fortunate as to have available the good quality coke which is necessary in the water gas process for making ammonia synthesis gas and various methods have been put forward for

using lower grade fuels. The Power-Gas Corporation were pioneers for instance in the application of oxygen for gasification purposes and it is interesting to note that they are building a large plant for the Dutch Government State Mines to produce synthesis gas with the aid of oxygen gasification equivalent in capacity to the production of 180,000 tons of Ammonium Sulphate per year.

Never before has it been possible to manufacture ammonia synthesis gas from such a low grade fuel as wood. On this account the pioneer development at Alwaye is so much the more interesting. The project, as originally planned, has been developed just as was contemplated. The initial troubles which invariably attend upon a new development, the so-called "teething" troubles, have been eliminated one by one and for sometime past the process has been working smoothly and satisfactorily—in fact it has now become an established method of synthesis gas production. It is particularly pleasing to the writer of this note, who was so closely involved with the first conception of the process that the staff concerned with putting the new plant into operation, have displayed such enthusiasm and have been proud to be associated with the establishment of a new process.

There is a very wide interest in many parts of the world about results of operating the Alwaye synthesis gas plant, for it opens up opportunities of using many low grade fuels which hitherto have been regarded as unsuitable. An actual example of this interest might be mentioned in passing, the recent booking of a contract by The Power-Gas Corporation for an ammonia synthesis gas plant in the Argentine, which though a good deal less in capacity than the Alwaye installation, is to work on exactly the same system.

Origin of "United Nations"

Alden Hatch in his biography of the late President Roosevelt has traced the origin of the word "United Nations" thus:-

In December 1941, President Roosevelt and Prime Minister Churchill spent hours discussing a name for the "grand alliance" of nations against Germany. The next morning as he was dressing, the President shouted "I have got it" and rushed to Mr. Churchill's room.

"Where are you, Winston ? he called.

"In my bath."

"I have to speak to you."

"All right, open up."

Roosevelt wheeled himself up to the door and swung it open. The Prime Minister's rotund torso rose from a welter of soap suds.

"Winston" Roosevelt shouted, "how about the United Nations". Mr. Churchill beamed through a mass of lather.

"That ought to do it" he exclaimed.

Industries in Travancore

GOVERNMENT'S KEEN INTEREST TO DEVELOP THEM.

Reproduction of the "contributed" article—By kind permission of the Editor, "Commerce", Bombay.

DURING the last decade, Travancore has made rapid strides in its industrial progress. In accordance with a well-planned programme for the development of the State's resources, several important items of work have, in recent years, been taken up for execution. Special reference may be made in this connection to the present efforts for increasing the food production in the State. All these activities are beginning to show satisfactory results. There is already a greater employment of the local people in the various industries: there is a noticeable improvement in the standard of living, and there is a conspicuous increase in the wealth of the State.

POWER DEVELOPMENT.

The development and expansion of hydro-electric power is the first step taken in this programme of industrialisation. The Pallivasal Hydro-electric Project, established in 1940, at a cost of nearly Rs. 1½ crores at that time, supplies power for industrial and agricultural purposes. The transmission and distribution net-works now cover practically the whole of North and Central Travancore where supply is available in most of the rural areas. The extension to the South is now in course of construction. Due to the large demand for power, the station at Pallivasal has been considerably enlarged and its capacity will shortly be about 39,000 k. w. The capital expenditure on this undertaking is now about Rs. 4 crores. The Sengulam Hydro-electric Project, which will utilise mainly the tail water of the Pallivasal Station, has just been taken up for construction at an estimated cost of Rs. 2 crores. The power that will be available from this source will ultimately be 48,000 k. w. This work is expected to be completed by 1950.

Power is now supplied to chemical, metallurgical and other industries of the State. It is also utilised on a large scale for agricultural operations both for lift irrigation and for the drainage of water-logged areas.

FERTILISERS & CHEMICALS.

The largest industry in the State at present is the Fertilisers and Chemicals (Travancore), Ltd., the investment on which so far is a little over Rs. 3 crores. Government hold 50 per cent. of the shares. The main factory of this concern is at Alwaye which will produce every year 50,000 tons of ammonium sulphate. There is a 75-ton contact sulphuric acid plant also installed

in the factory. Production has just commenced and is expected to reach full capacity within a couple of months. Orders have recently been placed for a plant to produce 20 tons of caustic soda and chlorine products per day. Other heavy chemicals are also proposed to be manufactured here shortly. Another factory of this concern is located at Kundara, where superphosphates will be produced. The plant and machinery required for the production of 50,000 tons superphosphates per annum are on order and are expected to be ready for operation within a year.

ALUMINIUM.

Another large industrial concern in the State is the Indian Aluminium Company, whose factory at Alwaye is the first and foremost producer of aluminium in India. About 2,000 tons of this metal are now produced in this factory every year, but it is expected that the production will be stepped up to 5,000 tons, as soon as additional electrical power becomes available from the Pallivasal and Sengulam Projects. Government have a large share in this concern which owns, besides, a rolling mill at Calcutta and a bauxite refining plant in Muri near Ranchi. The factory at Alwaye is staffed entirely by local personnel who number about 400 technicians and operatives.

The Aluminium Industries Ltd., was recently floated with a capital of Rs. 25 lakhs for the manufacture of aluminium cables and accessories. Government have taken shares worth Rs. 2 lakhs. All the plant and equipment have been ordered from Canada and England. The factory buildings in Kundara are approaching completion. In the early stages, the factory will concentrate on the manufacture of cables required for the transmission and distribution systems of the various electric supply undertakings in India.

Government have recently sanctioned a scheme for the installation of a sheet mill plant near Alwaye with a capital of Rs. 2 crores, of which Government will contribute 30 per cent. This plant will undertake the processing of not only aluminium, but copper, brass and other alloys. The entire factory is being designed by experts in the United States of America and will consist of rolling mills, extrusion press and equipment for wire-drawing, castings, etc.

RAYON.

The first factory in India for the manufacture of viscose rayon will be coming up very shortly at Perumbavoor, near Alwaye. The Travancore Rayons Ltd, with an authorised capital of Rs. 2 crores, in which Government hold 20 per cent of the shares, are well advanced with the construction of the factory. The plant and equipment are gradually coming at site, and there is a reasonable prospect of its coming into operation by the middle of this year. The factory equipments are manufactured in Great Britain in collaboration with Swiss technical experts.

Investigations conducted over a number of years have shown that "Eatta" reeds (Ochlandra Travancoria) which are available in very large quantities in the Travancore forests provide excellent raw material for the manufacture of pulp both for paper and for rayon, and this factory will ultimately use this local material exclusively for the process. It will commence with a production of five tons of rayon every day, but ultimately this will be doubled.

CERAMICS.

Extensive deposits of kaolin of the finest quality occur in the State. A ceramic factory under Government management has been in operation at Kundara for the last 6 years, and has produced very satisfactory results. The investment on this factory is about Rs. 12 lakhs, and it now produces refined clay of the finest quality which is very largely in demand by the textiles, paper and other industries. It also manufactures crockery and porcelain wares. An order has recently been placed in Switzerland for an electric tunnel kiln which will enable the daily production to be stepped up to two tons. The quality of the products will then be superior and the cost of production will be lower than what it is now.

There are two other large ceramic concerns in the State, one near Alwaye and the other at Ithikkara, which produce sanitary-ware, pipes and refractories, besides crockery. The manufacture of tiles and bricks is already a well-established industry in the State, and there are several factories already in existence, mostly along the coast.

GLASS.

The Travancore Ogale Glass Manufacturing Company, Alwaye, came into production in 1944. In spite of the serious handicaps caused by the war and the abnormal price of fuel, the operation of this factory during the last two years of its working has been very satisfactory. As a first programme in the expansion of the activities of the Company, the management are now proceeding with the installation of a sheet glass plant and an automatic bottle machine. The investment on this industry is about Rs. 10 lakhs, and Government hold a substantial block of share in this concern.

Proposals for the manufacture of soda ash in the State for meeting the requirements of this industry are under consideration.

CEMENT.

The Travancore Cements, Ltd., has recently been incorporated with a subscribed capital of Rs. 50 lakhs. Government are the most important share-holder in this concern. The factory is to be located at Nattakam near Kottayam. The construction of the buildings has just been taken up and the plant and machinery ordered from the U. S. A are expected to arrive at site any time now. The capacity of the factory will be 50, 000 tons per annum. The main raw material is lime-shell which abounds in plenty in the adjoining backwaters. Suit-

able clay is also available in the vicinity.

ENAMEL.

A small concern, The Travancore Enamel Industries, Ltd., for themanufacture of enamel-ware with a subscribed capital of Rs. 2 lakhs has just been started at Kundara. An up-to-date electric enamel kiln has recently been ordered from Switzerland. Other equipment also are on order. The factory may be expected to come into production within a year. Government are also a shareholder in this concern.

RUBBER.

The Travancore Rubber Works, an entirely Government concern have been in operation for about 10 years. The investment on the factory, which was built in the slump period prior to the last war, was only about Rs. 5 lakhs. But it has been doing quite a large volume of business in recent years and has been turning out a variety of products which are absorbed in the markets of India.

A scheme for the manufacture of rubber tyres and tubes for motor cars and trucks has recently been sanctioned by Government. This concern will have an authorised capital of Rs. 2 crores. An up-to-date plant from the United Kingdom and the U. S. A. will be imported and the work will be carried out in collaboration with technical experts from those countries. This scheme is expected to fructify soon.

PAPER.

Government have a large interest in the Punalur Paper Mills. This concern has been doing very good business during the war and has now reached its maximum production of about 3,600 tons per annum. The installation of additonal machinery and equipment for increasing the production and for improving the quality is under contemplation. The manufacture of paper bag containers is also being investigated.

MATCH.

The Vanchinad Match Factory in North Travancore has now reached a peak production of about 1000 gross per day. Some of the chemicals required by this factory are now made in Travancore by the Travancore Chemical and Manufacturing Co. at Kundara. All the timber required for this industry comes from the local forests. The management have under consideration the installation of additional machinery for stepping up the production.

The manufacture of splints and veneers is carried on as a cottage industry on a large scale in Quilon. Quite a considerable quantity of these is exported to the neighbouring British districts.

PLYWOOD.

The Travancore Plywood Industries, Ltd., is now an entirely Government concern. The investment on this undertaking is about Rs. 10 lakhs. The factory is capable of producing $2\frac{1}{2}$ millicn sq. ft. per year. It is now concentrating mainly on the manufacture of boards for

tea chests for which there is a large demand from the tea estates in the State. The factory is located near Punalur which is adjoining the forests from which all the timber required for this factory is exploited.

FOREST INDUSTRIES.

A company has recently been formed called the Forest Industries (Travancore), Ltd., with Government holding 51 per cent shares. The subscribed capital is Rs. 25 lakhs. The main activities of this concern are the exploitation of certain portion of the Malayattur forests for the extraction of firewood required for the production of gas in the Fertiliser Factory at Alwaye and of the other species of timber available there. This concern is installing a saw mill at Alwaye and proposes to take up other activities in due course.

SUGARS.

The Travancore Sugars and Chemicals Ltd., refines sugar from palmyra jaggery and extract alcohol, which is utilised for the manufacture of tinctures and other pharmaceutical preparations and toilet accessories. The Company is extending its activities by starting a cane sugar-factory at Thiruvella, the largest centre of sugar-cane cultivation in the State. The recovery of power alcohol from the waste molasses is also contemplated. The capital of this concern is Rs. 20 lakhs and Government hold shares worth Rs. 2·35 lakhs.

FISHERIES.

For the development of the fishing industry in the State, the West Coast Fisheries (Travancore), Ltd., has recently been floated. The subscribed capital of this concern is Rs. 25 lakhs, of which Government hold shares worth Rs. 5 lakhs. Government have also taken up, in collaboration with the Government of India, various schemes for the exploitation of the great scope, which the Travancore coast affords, for deep sea fishing and for the storage and transport of fish.

The plant and equipment for the cold storage of the West Coast Fisheries (Travancore) Ltd, are on order. The fishing craft and tackles have yet to be purchased and, for this purpose, the Managing Agents of this concern are now on a visit to the U. K, Norway, and Denmark.

The extraction and purification of shark liver oil has been taken up recently on a large scale under the auspices of the Marine Biology Department of the University of Travancore. The construction of a properly equipped factory is under consideration.

ELECTRICAL AND ALLIED INDUSTRIES.

The Travancore Electro-Chemical Industries, Ltd, was incorporated about two years ago with a subscribed capital of Rs. 10 lakhs. Government are a share-holder in this concern. The factory belonging to this concern is now in course

of construction at Chingavanam near Pallom. All the electrical equipments for this factory are being manufactured in Switzerland and are expected at site early next year. The main products from this factory will be carbon and graphite electrodes, carborundum and calcium carbide.

Another concern which has recently been registered is the Electrical and Allied Industries, Travancore Ltd. The authorised capital is Rs. 30 lakhs and Government have subscribed share worth Rs. 1 lakh in this concern. It will undertake the manufacture of electrical accessories like lamp-holders, switches, cut-outs, adapters, etc, besides plastic moulded products and a variety of non-ferrous fittings for buildings, pumping sets, table fans, umbrella ribs and fittings. The factory which is located at Kundara is in course of construction. Many of the equipments for the manufacturing work-shop are already at site, and the factory may be expected to commence production by the middle of 1948.

TEXTILES.

There is only one Textile Mill at present in the State, viz, the A. D. Cotton Mill, Quilon, with about 12,000 spindles and 200 power looms. It is obvious that this concern cannot meet even a fraction of the requirements of the State. Considering that there are over 40,000 handlooms which employ a considerable number of cottage labour, the necessity for increasing the production of yarn in the State has been keenly felt, especially at this time when there is a considerable shortage of cloth all over India. Two concerns have, therefore, recently come into existence, one the Vijayamohini Mills in Trivandrum with an authorised capital of Rs. 12 lakhs in which Government have subscribed shares worth Rs. 1 lakh, and another the Balarama Varma Textiles, Ltd., in Shencottah, in which also Government have subscribed shares worth Rs 1 lakh. Both these concerns have each ordered for 12,000 spindles, the former from Great Britain and the latter from Switzerland. It is quite likely that the Vijayamohini Mills may be able to start operation during the latter part of 1948 and the Balarama Varma Textiles may come into production during 1949. The Government of India have during the latter part of 1946, allotted 50,000 spindles to the State out of which the balance quotas available have been earmarked for two other concerns. The Alagappa Textiles at Alwaye is yet another concern which may be expected to come into operation within a couple of years. When all these mills start working, they will go a long way towards meeting the requirements of yarn not only for the handloom weavers but also for some more power-looms that are expected to be installed very shortly.

CANNING INDUSTRY.

Proposals for starting a canning factory in the State have been under consideration for some time, and a company has just been registered,

called the Travancore Packers and Canners, Ltd, with an authorised capital of Rs. 25 lakhs. Government have agreed to subscribe shares worth Rs. 3 lakhs. The main activities of this industry will be the canning of pineapples which grow abundantly in the State and the bottling and canning of prawns and other varieties of fish. The management are already in negotiation for the purchase of a complete canning plant and equipment for this factory, while a co-operative society has been formed at Punalur for encouraging the cultivation of pineapple on a large scale with a view to feeding this factory eventually.

EXPLOITATION OF MINERAL SANDS.

In order to make the fullest use of the State's mineral resources, it has been the policy of Government not merely to be satisfied by continuing to be exporters of these minerals from the State on a large scale, but to establish certain industries for the processing of at least some of them immediately. One of the minerals that are at present being exported on a large scale is ilmenite, which goes to the United States of America and the United Kingdom where it is used for the manufacture of titanium pigments. As a result of negotiations that have been completed by Government with experts engaged in this industry, a company has just been forned, called the Travancore Titanium Products., Ltd, with a subscribed capital of Rs. 36 lakhs, in which Government hold a controlling interest. A factory for the manufacture of five tons of titanium pigment per day has been planned, and the works in connection with it have just been started. As this industry is a very highly specialised one and involves the application of some of the most up-to-date technical processes, it was considered desirable to secure the collaboration of firms who are already engaged in this industry. Accordingly, the British Titan Products, Ltd, of Billingham, are collaborating in this local enterprise and are in charge of the technical and business operation One engineer and four chemists from the State have been selected by them for being trained in their works at Billingham so that they may be in charge of the local plant when they return.

Besides ilmenite, the other valuable minerals are monazite, zircon and sillimanite, of which the former has assumed considerable importance of late because of its thorium content Proposals for the utilisation of zircon for the manufacture of high grade refractories are now under consideration.

COCOANUT PALM AND ITS PRODUCTS.

The cocoanut palm contributes to the main wealth of the State. Many of the industries connected with its produce like the milling of oil from copra, the extraction of fibre from the husk, the spinning of the coir yarn and the manufacture of coir mats and mattings, occupy a predominant position not only because of their important contribu-

tion to the wealth of the State but also due to large-scale employment of cottage labour for all these operations. The coir mats and mattings are well known throughout the world markets for their exquisite workmanship, and they form one of the essential items of export from the State.

LEMON GRASS OIL.

This is another cottage industry which is carried on a large scale in North Travancore. This oil, which is obtained by distilling lemon grass, is in very great demand in the foreign markets, where it is used in the manufacture of high grade perfumery. The volume of export is quite considerable, and the recent figures show that oil worth over a crore of rupees was exported last year. Investigations are now being conducted to put this industry on a proper basis by enabling those engaged in it to adopt more scientific methods in its extraction, purification and storage.

Mannerisms at the Centre

It is learnt that:—

1. When Pandit Jawaharlal tears his lower lip down with his fingers, you can be sure he is thinking furiously and is preoccupied.

2. When the Sardar thinks, you will find him passing his palm tenderly over his bald pate at intervals.

3. "Kakasaheb" Gadgil cannot help shrugging his shoulders while he speaks.

4. Young Mr. C. H. Bhabha gently rocks from side to side while addressing the House.

5. Alone among the Ministers, Dr. John Mathai stands up straight like a statue as he speaks, with his hands either folded behind his back or clutching at the lapels of his coat.

Quite True.

Some years ago, the late Mrs. Sidney Webb was present at a dinner party, and a young man seated next to her, said: "All this talk about feminism is utter rot. There isn't a woman alive who wouldn't rather be beautiful than clever."

"Quite true," agreed Mrs. Webb. "But the reason for that, you see, is because so many men are stupid and so few are blind."

AMERICAN TRADE UNIONISM

AND

Mr. JOHN LEWIS

By

P. N. KRISHNA PILLAI,
Asst. Labour Commissioner, Alwaye.

Here is a first hand information about a baffling problem ... ... Editor.

"I enjoyed my own talks with Mr. Pillai very much, but I am little fearful that I learned more from him about India than he learned from me about United States. He does not understand that this country is baffling even to us." Thus wrote Mr. Harry Read, Executive Assistant to the Secretary-Treasurer of the C. I. O. (Congress of Industrial Organisation) to the Department of Labour in Washington after my interview with him which was arranged by them. The latter statement that the U. S. A. is baffling even to the people in that country is true. The currents and cross-currents in the politics of that country is much more baffling to an outsider.

Another instance of such a baffling situation is afforded by the news of the withdrawal of Mr. John L. Lewis, the strong man of the United States from the A. F. L. (American Federation of Labour). Of course, his secession from the A. F. L. means the secession of the United Mine Workers of America from that body since his word is virtually law with his Union. It is said that his differences with the A. F. L. arose out of the provision in the new Labour-Management law, commonly known as the Taft-Heartly Act, regarding the ban placed on the Communists from being office-bearers of Trade Unions. It is again baffling to an on-looker when one remembers that both the A. F. L. and Mr. John Lewis are anti-Communists.

It will be interesting to recall the incidents which led to the split in American Trade Unionism in which the leader of the United Mine Workers played the most prominent part. It is well-known that the split came about on the question of Craft Union versus Industrial Union. It was then really a difference based on organisationali deologies among the prominent leaders of American labour. Those who pleaded that the modern industrial developments warranted organisations of workmen on industrial basis first formed the Committee of Industrial Organisations. Mr. John Lewis was one of the sponsors of this Organisation. The parent body the A. F. L. which stood for Craft

Unions, took stern disciplinary action against the sponsors of the new move, which ultimately resulted in the dissenters forming the Congress of Industrial Organisation. Mr. John Lewis was the prime organiser of this body and its President for a number of years. All the subsequent attempts for a Trade Union unity in America have proved futile. At present there is no meaning in the split in American Trade Unionism viewed from an organisational point of view. The A. F. L. which refused to give international charters to Industrial Unions has admitted into its fold such strong international Industrial Unions like the United Mine Workers of America and international Ladies' Garment Workers Union. Now the split is not on organisational grounds. It is purely one based on personal power politics. I had interesting discussions recently with the leaders of both the organisations in U S. A. and both sides are agreed on this, namely that it is power politics that divide the ranks of American labour. In spite of all that one might hear of attempts at re-unification of American Trade Unionism, my reading of the situation is that there is little prospect for a united American labour in the near future.

Mr. John Lewis, who was one of the organisers of the C. I. O., broke away from that body again due to personal power politics of the United States according to many impartial observers. It is said that he wanted to be a candidate for the Vice-Presidentship during President Roosevelt's regime, which the President stoutly opposed. Mr. Lewis carried a campaign of opposition against the candidature of Roosevelt for the subsequent presidential election in which the C. I. O. chiefs did not lend their support to Mr. Lewis, for it was Roosevelt's New Deal Legislation that gave Industrial Unions the greatest prestige which they now enjoy. Mr. Lewis fell out with the C. I. O. and the United Mine Workers withdrew its affiliation from that body. The U. M. W. was for a while standing as an independent body without any affiliation with any Central Trade Union organisation. Subsequently, Mr. Lewis led his organisation into the fold of the parent body, the A. F. L. against which he unfurled the banner of revolt and organised its strong rival body. Now his secession from the A. F. L. marks another important event in the American Trade Union movement.

It was in last May that I visited the office of the United Mine Workers of America in Washington and interviewed this prominent figure in the U. S. A. labour movement. Earlier I had a prolonged talk with Mr. Thomas Kanedy, the right-hand man of Mr. Lewis who is Secretary. Treasurer of the U. M. W. of America. Mr. Kanedy explained to me how the Union which was started in 1890 is now the strongest working class organisation with 3, 500 locals. He, of course, refuted the oft-repeated charge in U. S. A. that Mr. Lewis and himself are the virtual dictators of this organisation. He pointed out that in every four years the offi-

cials of the Union are elected by referendum vote in International Conventions. When I was taken to the presence of the President, I felt that I was being ushered into the chambers of an Oriental chieftain rather than into the working room of a democratic head of a modern Trade Union. Mr. Lewis was there with the prominent members of his executive. The Taft-Havtly anti-labour Act was passed by the Senate and everyone was anxiously waiting to see the next step taken by President Truman who was known to be against the measure. The U. M. W. were putting up a stout opposition to the new law. In fact it was an open secret that some of the main provisions of the Act were intended to combat the threatened strike in coal mines when the Government released the mines to the mine owners by the end of June 1946. Mr. Lewis was engaged in negotiations with the mine owners for the next contract and was in a subtle battle with them in order to circumvent many of the provisions of the new law. It may incidentally be stated that this mighty leader of the American miners subsequently succeeded in his endeavours and ultimately negotiated a deal which increased the wages, doubled the welfare fund and circumvented some of the provisions of the Taft-Hartly Law.

I had a prolonged and interesting discussion with this great leader of American labour on various topics concerning the Trade Union problems both in U. S. A. and India. In spite of all that is said against him you feel that you are in the presence of a great personality whose untiring work for the coal miners has made him their unquestioned leader. His quick grasp of things, domineering personality and shrewd intelligence attracts even a casual observer. He is a strong friend of Independent India and he has always stood for the independence of colonial people. He is against nationalisation of mines in the United States. He said that the miners had gained little during war years when the coal mines were under Government control. He seemed to be a firm believer in the American theory of private enterprise. He explained to me the provisions in the previous contract with regard to the welfare fund in the mines by which the employer paid five cents per every ton of coal produced to the fund. The contract for the coming year provides for ten cents per every ton produced As per the terms of the last contract, the fund came to five hundred and fifty million dollars. The widow of a miner gets thousand dollars after his death from the fund. The fund is also intended to be utilized for pension, workmen's compensation, sickness benefit, etc. Mr. Lewis proudly showed me the first cheque for a thousand dollars which was to be paid to the widow of a miner.

There is no gainsaying the fact that his leadership has made his Union the strongest International Union in U. S. A. and that the miners have benefitted immensely. Even his worst enemies will concede the fact that he is a first-rate leader with outstanding ability. None the less, one cannot escape the impression that the United Mine Workers' office looks like the palace of an Oriental autocrat. This was the impression that I gave to a labour press news agency when they interviewed me after my visit to Mr. Lewis. When we parted, Mr. Lewis said in a moving voice: "I wish the best for India and her people" and I can assure the people of India that this mighty man of the United States is a real friend of our country.

How to use Ammonium Sulphate and Superphosphate FOR Paddy, Sugarcane, Plantain, Coconut, Pepper and Tapioca Crops

BY T. S. RAMAKRISHNAN B. Sc. (AGRI.)
Agricultural Chemist, F. A. C. T. Ltd.

PADDY CROP:

Dose per acre: Ammonium Sulphate - 100 to 150 lbs.
Superphosphate - 112 to 224 lbs.

When to Apply:-

Apply Superphosphate over the fields prior to or during the preparation of the puddle. During the subsequent ploughings, the super will be intimately mixed with the soil-particles. Such a mechanical mixing is essential for producing maximum results.

Ammonium Sulphate is best applied about one month after planting of paddy. For long duration varieties the application can be postponed still further-to 50 to 60 days after planting. Such a late application to the standing crop will produce the most profitable results. If superphosphate had not been applied earlier i. e. during the puddling process, then it can be applied along with ammonium sulphate, the two being intimately mixed together.

How to apply:

The two fertilisers are generally broadcast over the fields, as uniformly as possible. Before scattering the fertilisers, the farmer must ascertain the probable areas of each of his fields, so that he can divide the total quantity of the fertiliser into several heaps, in proportion to the areas of his fields. In order to facilitate even distribution, the fertiliser can be diluted, if necessary, with fine sand or soil (about 4 times the volume of the fertiliser) and the diluted mixture may then be uniformly scattered over the fields by an even sweep of the hand. If ammonium sulphate is being applied in conjunction with an oil-cake, like ground-nut oil-cake, then the two (about 400 lbs. of oil-cake plus 112 lbs. of ammonium sulphate) should be well mixed together and broadcast over the fields. No dilution will be necessary in this case. Ammonium Sulphate can also be applied over a basal dose of about 2000 lbs. of green leaf—the latter having been incorporated earlier, that is, during the puddling process.

Effect on the crop:

Ammonium Sulphate supplies nitrogen (20 to 21%) in the ammoniacal form, which is distinctly preferred by the paddy crop. The nitrogen becomes available almost immediately after the application of the fertiliser and its effect on the crop is clearly seen within a very short time, even within a week.

Vigorous growth, rapid development, a healthy dark green colour, profuse tillering and an ultimate enhanced grain and straw-yield are some of the effects of Ammonium Sulphate on the crop.

Application of Superphosphate remedies the serious phosphorus deficiency, that is generally met with in most of our soils. Adequate supply of phosphorus induces greater root-development, early maturity, a decided increase in the flowering capacity and seed-formation, which finally results in an increased grain-yield.

SUGARCANE CROP:

Dose per acre:

Ammonium Sulphate-200 to 250 lbs.
Superphosphate - 224 lbs.

When and how to apply:

The two fertilisers should be mixed well and the mixture can be applied in two doses—one half is to be applied at the time of planting (applied broadcast over the field prior to the ploughing and the formation of ridges and furrows for planting cane), the other half dose should be applied at the time of tillering, that is, about 3 to 3½ months after planting. The second application must be done in between the cane-rows, and this should be followed by a copious irrigation. In addition to these fertilisers, oil-cakes are generally applied to cane crop. Nearly 600 to 700 lbs. of ground-nut oil-cake may be applied for an acre along with the mixed fertiliser.

Thus an ideal mixed dose for sugarcane crop per acre will be:

Ammonium Sulphate	200 to 250 lbs.
Superphoshate	224 lbs.
Ground-nut oil-cake	600 to 700 lbs.

In soils showing potash deficiency (as in the case of West Coast soils) potash manures such as potassium sulphate may be applied to supply 50 lbs. of potash per acre. In the absence of potassium sulphate wood-ash may be used at the rate of nearly 1000 to 1250 lbs. per acre.

PLANTAIN CROP:

Dose:

Ammonium Sulphate
3 to 4 ozs. per tree.
Superphosphate 4 ozs. „

When and how to apply:

These two chemicals must be well mixed and applied around the base of the tree. Application should be done not very near the base but about a foot away from it. The earth may be scooped up and the fertiliser-mixture applied and then covered by a layer of soil. Application must be carried out during the rainy months. In the absence of rains fertilisation must be followed by good irrigation.

The proper time of application is 2 months after the planting. The application may be renewed once more 2 to 3 months hence. These two doses will not fail to induce maximum production.

PEPPER:

Dose per vine:

Ammonium Sulphate	4 ozs.
Superphosphate	4 ozs.

An ideal all-round dose for pepper:

Ammonium Sulphate	4 ozs.	per vine.
Superphosphate	4 ozs.	„
Wood-ash	3 to 4 lbs.	„
Lime	6 to 8 ozs	„
Leaf-mould	20 lbs.	„

How and when to apply fertilisers:

The mixture of Ammonium Sulphate and Superphosphate may be applied in a trench dug around the base of the vine. Application must always be done during the rainy months of June-July. Leaf-mould can be applied along with fertilisers but wood-ash and lime should on no account be applied with Ammonium Sulphate, for the simple reason that we will then be losing Nitrogen. They may be applied a month prior to or after the application of the fertiliser-mixture.

The composite dose recommended above is sure to increase the yield of pepper-vine substantially.

COCONUT CROP:

Dose per Tree:

Ammonium Sulphate	4 lbs.
Superphosphate	6 lbs.

How and when to apply;

This mixture is to be applied in a circular trench (6 feet radius and 9″ deep) dug around the tree. Always apply the fertilisers during the rainy months, and not in summer. It has been found that application in a round trench is better than broadcasting the fertilisers over the surface. These fertilisers will at once inject health into the trees and will ultimately give us the maximum production of nuts. It has been experimentally proved that most of the diseases that attack this important crop are really due to the mineral deficiencies in the soil and these fertilisers go to remedy these deficiencies and thus they improve the health of both the soil and the crop.

An ideal all-round dose for coconut crop:

Ammonium Sulphate	4 lbs.	per tree.
Superphosphate	6 lbs.	„
Wood-Ash	20 to 25 lbs.	per tree.
Cattle Manure Or River Silt Or both	100 lbs.	„

This is an effective and complete dose and will supply all the requirements of the tree. A tree which is fitly called "The Kamadhenu Vriksha" - a tree whose every part is useful to mankind, deserves a better treatment at our hands. In this connection it may once again be mentioned that ash should not be applied along with Ammonium Sulphate. Ash can be applied a month prior to or after the application of Ammonium Sulphate.

TAPIOCA CROP:

Dose per acre:

Ammonium Sulphate	112 lbs.
Superphosphate	100 to 150 lbs.

How and when to apply:

The tapioca crop generally receives only cattle manure and ash. The two fertilisers can be

mixed together and applied about 2 to 2½ months after the planting of tapioca sets. The earth around each plant may be scooped up by a fork or an iron blade and the fertiliser-mixture applied and then covered by a layer of soil. Application must be carried out only during rainy months, June-July or Sept.-October. The two fertilisers will increase the growth and development of the crop and also will induce greater root development and a consequent increased production of tubers.

An ideal all-round dose for the tapioca crop will be:

Ammonium Sulphate	112 lbs.	per acre.
Superphosphate	100 to 150 lbs.	„
Cattle manure	2 to 3 tons	„
Wood-Ash	700 to 1000 lbs.	„

Cattle manure and ash are to applied at the time of planting while the fertilisers are to applied 2 to 2½ months after planting.

"A sense of the *whole* is a sign of a sound mind, and there is nothing more to be desired at the present moment."

— PLATO —

Einstein Relativity-Illustrated

When you sit with a nice girl for an hour, you think it is only a minute; but when you sit on a hot stove for a minute, you think it is an hour. That is Relativity.

Mathemagics

People who find ordinary mathematics troublesome should try to be mathemagical. Try this on yourself: —

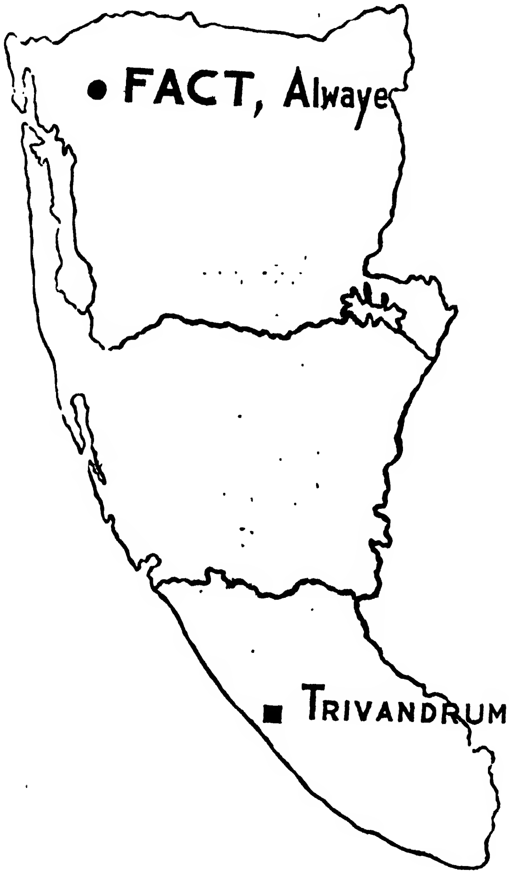
Write down the year you were born in;
Under it the year of your marriage;
Under it how many years since you are married;
Under it your present age;
Total up and divide by 2.

Result will indicate the current year in all cases.

From Rest to Unrest

"God made the world and rested;
God made man and rested;
Then God made ....woman;
Since then no one has rested."

FACTS ABOUT TRAVANCORE



(1) Is 7661·75 Sq. Miles in area.

(2) Has a population of 60,70,018 as per 1941 census,
of which 30,45,102 are males and
30,24,916 are females.

(3) Has over 47% of literacy, being the highest literacy percentage in India.

(4) Has a revenue of about Rs. 976·63 lakhs per year.

(5) Has a total area of 2465 Square miles (ie. about 31% of the total area) of forests.

(6) Has 632,255 acres under Paddy cultivation.
" 477,002 " " Tapioca "
" 316,882 " " Cocoanut "
" 111,615 " " Rubber "

Mr A. J. JOHN,
President of the Travancore Constituent Assembly.

Mr. C. KESAVAN
Minister

In charge of:- Public Health; Medical; Ayurveda; Local Self-Government, and Village Uplift; Stationery and Printing; Rent Control; Excise; Forest; Anchal; Labour; Resettlement of Ex-service men; Public Service, and Protection of Backward Communities.

Mr. T. M. VERGHESE
Deputy Prime Minister

In charge of:- Education; Industries; Geology and Mining; Fisheries; Co-operation; Ports; Registration; Economic Development; Commerce; Export and Import Trade Control; Control of prices of Cocoanut, Rubber, Coffee etc., Marine Department, Post-war Reconstruction and Transport.

PHOTO SHOWS THE HEALTHY GROWTH (9 FT.) OF MAIZE CROP IN OUR EXPERIMENTAL GARDEN, PROPERLY FERTILISED WITH AMMONIUM SULPHATE.

Has 91,152 acres under Pepper cultivation.
" 77,354 " " Tea "
" 35,532 " " Ginger "
" 14,795 " " Sugar-cane "
" 7,034 " " Coffee "

(7) Has to depend on outside sources for about 60% of its food requirements.

(8) Has in more than 90% of its soil both nitrogen and phosphoric acid as the chief limiting factors for crop-growth.

(9) Has besides organic manures, an annual requirement of 86,380 tons of Ammonium Sulphate and 1,05,169 tons of Superphosphate as shown in the accompanying table for the five crops mentioned therein:-

Manurial Requirements for Crops in Travancore State.

A—AMMONIUM SULPHATE

B—SUPER PHOSPHATE

Crops	*Area in acres	Requirements of A in tons per crop	Requirements of B in tons per crop	REMARKS
1. Paddy	632,255	42,339	42,339	A. 150 lbs. per acre B. 150 lbs. per acre
2. Sugar-cane	14,795	1,651	1,321	A. 250 lbs. per acre B. 200 lbs. per acre
3. Cocoanut	316,882	33,952	56,586	A. 3 lbs. per tree (Minimum of 80 trees per acre) B. 5 lbs. per tree
4. Tea	77,354	7,735	3,868	A. 2 cwts. per acre. B. 1 cwt. per acre.
5. Coffee	7,034	703	1,055	A. 2 cwts. per acre. B. 3 cwts. per acre.
	Total	86,380	1,05,169	

(*The figures about area are as given by the Director of Agriculture, Trivandrum.)

(10) Has a fertiliser plant at Alwaye with a designed annual capacity of 50,000 tons of Ammonium Sulphate and 20,000 tons of Superphosphate.

SAFETY RULES

(By P. B. MENON, SAFETY ENGINEER.)

Enumerated below are some of the golden rules of Safety in the Plants, the strict observance of which will greatly assist in eliminating accidents and the consequent loss of time and money both to the employee and the employer.

i) All employees must, upon entering an authorised gate of the plant, present their credentials for approval and only after it is obtained can enter the plant area.

ii) Employees are allowed on the plant only at such times as their duties may require them to be within the boundaries of the reservation. All entrances and exits must be made through authorised gateways.

iii) Intoxicants of any type such as beer, wine etc. must not be brought into the Works. No person shall carry matches, lighter or other means of producing flame or spark in places where fire and explosive hazard exist.

iv) Running, jumping, horseplay and yelling are prohibited.

v) Acquaint yourself with special rules and regulations regarding your work before commencing work.

vi) Make a practice of observing unsafe conditions and correcting them at once. If it is beyond your control, report to your superior immediately. Your observations will help you and your employer to maintain a high standard of safety performance.

vii) Cleanliness is necessary for a safe plant. Deposit rubbish in a proper receptacle. Instrument panels, sight glasses, floors, window sills, etc. must be kept clean and aisles to passage ways always free of encumbrances.

viii) Do not ride on loads being lifted or hauled by mechanical means.

ix) Welders must obtain approved permits in writing before burning or cutting on any equipment having contained or containing inflammable materials.

x) Ladders must be properly equipped with safety feet or placed so that there is no danger from slipping.

xi) Nothing should be piled in front of panel boards, or places where it may be necessary to have access in an emergency. Maintain materials in proper storage places.

xii) Hallways, stairways, aisleways and exits are to be kept free at all times.

xiii) Eat lunches at designated areas and wash your hands before eating.

xiv) Any doubt existing about your job should be clarified by asking your superior what to do or what precautions are to be taken.

xv) The employees should not waste their time in idle talk

and transit information relating to company business.

xvi) Provide yourself with suitable clothing before starting a job. Shoes with safety toes will protect your feet. Canvas shoes are not allowed in operating areas. Shoes having iron tips are not allowed in the Ammonia or Gas plants.

xvii) Proper goggles are required to be worn when chipping, grinding, breaking concrete, working on ammonia, acid, caustic or copper liquor lines.

xix) Sleeping while on duty will not be tolerated.

xx) All employees are expected to stay within their working zones and not roam throughout the plant or any other areas.

xxi) All accidents and personal injuries are to be reported immediately to delegated authorities. All cases of accident must be reported to medical centre for treatment.

xxii) Neglect or carelessness resulting in damage to plant property will not be tolerated.

xxiii) Each employee is expected to spend the hours indicated in the work in which he is regularly engaged and not in other activity.

xxiv) All safety rules must be carefully studied and followed at all times.

xxv) Do not enter or even look into the enclosures where electric arc welding is being done. A short exposure of the eyes to the arc may cause blindness.

xxvi) All excavations must be guarded to prevent persons falling into them. Use a red light at night and a red flag by day.

SAFETY FIRST

"SAFETY FIRST" CALLS EVERY WHERE,
ART AND SMART CARTOONS DECLARE.
FANCY MAKES YOU DO UNWANTED,
EVER AN ACCIDENT TO BE HAUNTED.
THEN AGAIN FRESH CARTOONS FOLLOW-
'YEARN TO PRECEED, EVER TO FOLLOW.'

FITTERS JOB TO THE FITTING MAN,
IT BE FOLLOWED EVERY DAWN.
RISKY MECHANIC HANDLE ELECTRIC WORK,
SURE SIGN OF MAKING A BAD WORK,
TREADING FAST A RISKY PATH
EVER TO FALL IN DANGER'S WRATH.

— PANICKER.

Question Box

(In this section answers are given by our Agricultural Chemist to Questions received from the public on soil, agriculture and use of Fertilisers)

Question No. 9.

My paddy fields are attacked by an insect and I see floating on the water, lot of paddy leaves cut off into bits. Can you suggest a remedial measure?

Answer:

From what you say the attack is most probably due to Rice Case Worm (Nymphula Depunctalis). This worm generally lives within a case made of bits of rolled up paddy blades. If the attack is virulent then we can see plenty of such bits floating on the water. Normally the attack will assume more serious proportions when the crop is young. The crop is weakened by the devastation of this worm and if the ravages are not checked promptly very serious loss may ensue. The control measures consist in draining off the water from the fields for a time. This is a simple inexpensive remedy and it will be effective, for, the worm needs plenty of water for its existence. If draining is not feasible then worms adhering to plants can be shaken off by drawing thorny branches across the field and then kerosene can be poured over the standing water so as to form a thin film, which will kill all the floating worms. A third and more effective measure is to use a dilute DDT solution. Give at least two sprayings on alternate days. From our own experience we can say that this method will be very effective.

Question No. 10.

My Ginger crop shows a peculiar disease. The leaves turn brown and grey in colour and the ginger also does not show full development. What is the remedial measure for this phenomenon?

Answer:

The information is quite meagre and not adequate for a good diagnosis. Yet the symptoms mentioned by you point to a fungal attack. The disease is called the leaf spot disease of ginger and is caused by a fungus called Vermicularia Zingiberae. It is quite common in Godavari and Malabar Districts. The parasitic fungus is present within the plant and it feeds at the expense of its host, The ginger crop is highly weakened and the rhizomes will not show normal development. The leaves develop yellowish brown spots whose centre will be invariably grey in colour. The most effective control measure is to spray Bordeaux Mixture on the crop. Give at least two sprayings. If the disease is detected in the initial stages of infection, then much damage can be avoided. The unaffected crop surrounding the infection portion can also be given a protective spray.

Question No. 11.

How exactly does a plant take in its nutrients from the soil?

Answer:

Every plant needs four important things for healthy development and these are air, sunlight, water and minerals. Of these four, the soil supplies the last two. Only those mineral salts that are found dissolved in the soil-water can be taken up by the plant-roots. The exact method of absorption adopted by the plant is called Osmosis in Physical Chemistry. Let me explain this phenomenon in simple language. Every solution possesses what is termed as osmotic pressure, which is the cumulative force of billions and billions of dissolved molecules (ions - to be more exact) rushing about within the solution and bombarding the dividing wall. The solution (sap) inside the root-hairs (the finger-like growths on the young roots) has by Nature's design a higher pressure than that of the soil solution which contains the plant nutrients such as uitrates, phosphates, potash salts, etc. These two solutions are divided by a thin permeable membrane, namely, the "Skin" of the root-hair. There can't be status-quo or stable equilibrium, for the pressures on either side of the membrane are not equal. So, the dilute soil solution enters the root-hair in an attempt to make the plant sap more dilute and thus reach an equilibrium. But an equilibrium is never reached, for the absorbed mineral water is continually drawn up towards the upper parts of the plant and the excess water goes off as vapour from the broad leaves. Thus a steady stream of water supply is maintained.

Question No. 12.

Most of the west cost soils are said to be acidic in reaction. May I know the reason?

Answer:

It must be remembered that all soils that are under intensive cultivation tend to become acid gradually because cultivation itself hastens the loss of calcium from the soil. It is true that acidity may also be due to the composition of the parent material from which the soil is derived. But in regions like the west coast that have very heavy precipitation, the torrential rains steadily leach out the lime from the soil. The rain water as it descends from the clouds dissolves carbon dioxide from the air and as it percolates down into the soil, it dissolves the calcium carbonate (lime stone) in the soil and so the soils in such regions of high rainfall lose lime speedily and turn acid. The easiest and direct method of *correcting such acidity* is to apply lime or chalk. As the applied chalk has to be mixed intimately with the soil particles, one or two ploughings should be given after liming.

NEWS & NOTES .... in brief

SHORTAGE OF NITROGEN FERTILISERS.

It has been estimated that India needs approximately 1,500,000 tons of *nitrogen* per annum. The total amount of nitrogen available from cowdung is about 320,000 tons, which leaves an overall shortage of some 1,200,000 tons. Even if one-half the oil-cake produced in India could be used for manurial purposes, the country would still be deficit in nitrogen by about 1,000,000 tons per annum. Other sources of nitrogen are green manures and town composts, but the former can be grown only under certain conditions and the latter is used mostly for market gardening. Chemical manures will, therefore, have to be imported from abroad until India is able to manufacture her own requirements of sulphate of ammonia. Nitrogenous manures are controlled by the International Emergency Food Council. Assuming that India desires to increase her production of food-grains in 1951–52 by 3,000,000 tons, India requires 800,000 tons of Sulphate of Ammonia in the current year, against which she is not likely to secure more than 100,000 tons. It is obviously necessary that manufacture of chemical fertilisers in existing factories should be speeded up and the starting of additional plants encouraged. It is interesting to record here three new schemes to erect fertiliser plants:—

THE NEW PLANTS TO PRODUCE AMMONIUM SULPHATE.

1. *Argentine Plant*

The Power-Gas Corporation Ltd., England have recently booked a contract for an Ammonia Synthesis Gas Plant in the Argentine which though a good deal less in capacity than the plant of the Fertilisers and Chemicals, Travancore Ltd. at Alwaye is to work on exactly the same system.

2. *Australian Plant*

Latest addition to the rapidly-growing list of new industries being started in Australia is an announcement by the Electrolytic Zinc Company of Australasia Ltd. that it will spend the equivalent of Rs. 2½ crores on a new plant to manufacture sulphate of ammonia.

The factory will be an adjunct to the company's ore-processing works at Risdon, Tasmania, and when in full operation will have an output of 50,000 tons a year.

Final negotiations are now being made for the purchase of electric power on satisfactory terms and for permission to import some of the necessary machinery.

Five plants are required, to produce hydrogen, nitrogen, ammonia, sulphuric acid and sulphate.

Apart from industrial uses, a great deal of sulphate of ammonia is used in Australian primary industries for fertilisers.

Present supplies are insufficient. About half of what is needed now comes as a bye-product from gas works and coke ovens.

To relieve the shortage, four small plants owned by the Federal Governments are being converted to produce Sulphate of Ammonia, and one is already operating.

In these the cost of production would be relatively high, because of the cost of the raw materials, coke and brimstone.

At the proposed Tasmanian plant, sulphur would be obtained from the zinc concentrates, and the use of hydro-electric power would supply the other constituents.

3. *Mysore Plant*

Mr. H. C. Dassappa, Minister for Industries, Mysore, said at the All-India Industrial Conference held at New Delhi in December 1947 that a scheme for installing a large scale chemical fertilizer plant for manufacturing 25,000 tons of Ammonium Sulphate and 25,000 tons of nitro-lime per annum has been approved by the Government of India and that orders for the same would be placed shortly.

PROGRESS OF MECHANICAL CULTIVATION IN INDIA.

The following facts were given by the Hon'ble Shri Jairamdas Daulat Ram on the 20th of February '48 regarding the progress of mechanical cultivation in India.

(a) The progress made in various Provinces in mechanical cultivation is indicated below:—

U. P:— The Government of the United Provinces have prepared a scheme for reclaiming 1,50,000 acres of waste land during the next five years. Operations have started for reclaiming 20,000 acres in Meerut Khaddar and 50,000 acres in Nainital Tarai. It is expected that about 10,000 acres will be reclaimed in each of these two areas by the end of May 1948. Arrangements are also being made for follow up cultivation in these areas after the lands have been reclaimed. Tractor operations are also expected to begin shortly in Jhansi for eradication of kans on about 10,000 acres.

C. P. & BERAR:— The Government of the C. P. & Berar have a five year plan for reclaiming 50,000 acres of kans infested lands. The Provincial Government have completed preliminary arrangements for ploughing ten thousand acres of this land in the Saugor District and a unit of 30 tractors for ploughing fallow land of the cultivators on demand.

BIHAR:— The Government of Bihar have a plan to reclaim about 40,000 acres in Saharsa District. Of this 6,600 acres have already been reclaimed by manual labour. The Provincial Government are also examining the possibilities of reclaim-

ing large tracts of land in South Bihar and Chota Nagpur.

ORISSA:— The Government of Orissa have a five year plan for reclaiming 50,000 acres. A unit of the Central Tractor Organisation is expected to reach the site near Sikonda in October 1948 for operations.

The Government of the West Bengal and Bombay have a five year plan for reclaiming 50,000 acres and 30,000 acres respectively.

b) The colonisation acres in the Khadar and Tarai possess sufficient moisture. Artificial irrigation is, therefore, not an important prerequisite to the successful fruition of development programme in these areas It is, however, proposed to install tubewells to provide water whenever required as an insurance against drought.

c) Reclaimed land in the Khadar and the Tarai will be allotted to colonists on a 10 acre unit basis on an annual rent of Rs. 6/- or Rs.7/- per acre. The cultivators will possess hereditary rights but will not be allowed to sub-let or alienate their holdings. They will have to conform to the rules and regulations of the Co-operative Societies in the matter of cultivation and management.

d) Government contemplate building houses for settlers in Khaddar and Tarai area and will recover the cost in 20 to 25 years. There is no question of giving accommodation in Jhansi as no new settlers are involved at present.

STEPPING UP MANURE PRODUCTION.

In view of the present unsatisfactory food position in the country and the need for mobilising all available resources in the matter of manure supply, the Government of India have appointed a "Central Manure (Compost) Development Committee" with Mr. Jairamdas Daulatram, Food and Agriculture Minister of the Government of India as Chairman.

The Committee, says a Press Note from the Ministry of Agriculture, will review periodically the progress of compost production and allied schemes in India, work out detailed plans for increasing the rate of compost production in the country so as to cover the whole of the refuse materials available in the rural and urban areas; consider such other schemes and plans as may be entrusted to the Committee by the Government of India from time to time, review the work done and frame a programme for the next six months, organize Provincial Compost Development Conferences and Committees in different areas for the purpose of co-ordination and intensification of work, and undertake and organize intensive propaganda for securing complete development of local manurial resources.

RYOTS "FERTILISER-CONSCIOUS"

Madras Agricultural Minister's Speech in Budget Debate.

Opening the budget debate in the Assembly under the demand

"Agriculture", the Madras Agricultural Minister said that the Grow-More Food Campaign has been consolidated into a five-year plan which had been accepted almost in full by the Government of India. The Government were taking steps to improve research and communicate the results to the ryots for their benefit. *The ryots for the first time had become "fertiliser-conscious."* On account of this campaign the yield of paddy increased during 1946–'47 from 6·33 to 7·34 million tons. During the current year it was expected that the use of manure and improved seeds would result in an increased production of about four lakhs tons of paddy. The total area under food crops have also increased considerably from 26·43 to 27·63 million acres, the acreage under paddy alone increasing from 10·20 to 10·99 million acres.

SUMMARY OF I. F. A. P's AGRICULTURAL REPORT ON THE WORLD RICE POSITION.

The report of the International Federation of Agricultural Producers states that it would take rice-exporting countries another five years to reach their pre-war levels of export and even this would be insufficient to meet the increased demand due to the increase of population being out of proportion to the rice-growing areas.

Estimates place the total world rice harvest for the 1947-48 season at 6,950,000,000 bushels, an increase of 50,000,000 bushels over the previous season's total, but considerably below the 7,400,000,000 bushel crop of the prewar period.

The agricultural plans of many rice-producing countries for additional cultivation of crops has been formulated.

Burma, the main exporting country, has set herself a target figure of 800,000 tons for the first six months of 1948 as against 542,000 tons exported during the corresponding period of 1947. Burma's total exports for 1947 exceeded 800 000 tons.

Siam which is the next largest exporting country has taken up considerable irrigation projects which are expected to increase yields by 1,300,000 tons of rice. Siam sent only 232,000 tons of rice abroad out of a target figure of 375,000 and aims at a lower amount of 250,000 tons for the first six months of 1948.

Malayan Government hopes in the next ten years to bring 600,000 more acres under cultivation. 73,000 additional acres were put under cultivation last season. Experts are looking ahead to the development of mechanisation in the rice areas.

The two largest producers of rice are China and India. Even prior to World War II, they were finding it difficult to feed their own peoples. From 1935 to 1939 China imported 750,000 tons while India imported 1,500,000 tons of rice.

The F. A. O. report on rice issued in June 1947 emphasized the in-

creasing requirements due to the rapidly rising population of Eastern countries. The report stated "It is abundantly clear that there will be hunger and pressure on the world market for rice until a substantial increase in rice production in the Orient is secured." The chief obstacles lie not only in the inadequacy of farming methods—that is, lack mechanisation *and insufficient use of fertilisers*—but in the system which prevails all over the East of cultivation in small plots by millions of subsistence farmers.

AGRICULTURAL PLANS OF BIHAR GOVERNMET

Control of Plant Diseases.

The Government of Bihar are considering various schemes for the control of plant disease and pests in the province. An Entomologist has been appointed to work on the control of pests. A Mycological section has been created in the Dept. of Agriculture and it is proposed to appoint an experienced Mycologist. As a result of the discussions with the Chief Mycologist of the Plant Protection Division of the Ministry of Agriculture, Government of India, all the rabi seeds sown at the Sabour Farm have been treated with Agrosan G, an organic mercury fungicide and if the results are found encouraging and satisfactory, the Government proposed a scheme *for treating paddy as well as wheat seeds* before they are distributed to the growers.

Distribution of seeds.

Planned distribution of improved type of seeds is essential to obtain increased yield of crops per acre. The Government have accordingly introduced a system of registered growers for growing *improved types of paddy and wheat seeds*. Though satisfactory progress has not been done in this connection it is proposed to eradicate difficulties in the future.

Supply of manures and fertilisers.

The Government have decided *to distribute about 20,000 tons of sulphate of ammonia* and 1,000,000 maunds of oil-cake each year to the cultivators for reasonable price. The distribution will be done by the Credit Agricole functioning under the Co-operative Department.

"JALA UHSA" THE FIRST INDIAN-BUILT OCEAN–GOING STEEL SHIP.

March 14, the memorable day on which "Jala Usha" was launched, opens a new chapter in the shipbuilding industry in India. "JALA-USHA" is a single screw cargo steamer with a dead-weight capacity of 8,000 tons and a draft of 25. Her overall length is 415', moulded breadth 52' and moulded depth 30'6". She will be propelled by a triple expansion reciprocating engine developing 2,699 H. P. from 3 coal-fired single-ended scotch Boilers. Her trial speed would be 11½ knots with a knot less in service."

"JALA USHA" is the first steamer constructed in an Indian ship-yard by Indian labour with Indian capital under Indian direction and for the use of Indian Com-

merce. The enterprise of Scindias was really fortunate to have had the pioneer pilot of Free India's Ship of State, Pandit Nehru, for launching the ship. On this historic occasion, Pandit Nehru recalled India's glorious past and reaffirmed the country's determination to win back its proper place in the sphere of shipping.

India's coastal trade at present is worth about ten crores of rupees a year and on modest computation at least a hundred vessels are necessary to cope with that trade. It is noteworthy in this regard to mention that the pioneering venture made by Messrs. Narottam Morarjee and Walchand Hirachand, the eminent industrialists of India, has born fruit and that a scheme for the development of this ship-building yard at Vizagapatam is under the consideration of the Government.

FOOD PRODUCTION DRIVE IN COCHIN STATE:

1000 acres brought under cultivation.

A vigorous food production drive has been launched in Cochin State by the Minister for Food and Education. The Panchayat Department has planned over 70 items of work and the first of these has been almost completed in Trichur Taluq by the silt clearance of the Thorinchal stream which has brought under cultivation 1000 acres.

The Thorinchal strem was 60 feet broad and formed the main canal for navigation from Karanchira. Silt clearance on a portion of this stream covering a distance of over 6000 feet was recently taken up and has been successfully completed.

ATOMIC ENERGY DEVELOPMENT IN INDIA.

Dr. Sir S. S. Bhatnagar, Director of Scientific and Industrial Research, Government of India in the course of a speech at The Dr. Alagappa Chettiar College of Technology, at Guindy said that the Atomic Energy Bill was to be piloted in the Constituent Assembly and would become law before long and that Atomic Laboratories would be set up in two or three centres in India where scientific activities would be carried on a high level. Referring to the great part to be played by South India in the future scientific renaissance of India, Dr. Bhatnagar was hopeful that if a proper land effective survey was made by competent scientists of the Thorium and Uranium in the Travancore Sands much larger quantities would be discovered in the area.

Speaking on the same subject of "The Atomic Age" Dr. Meghnad Saha, in an address at the All-India Exhibition Lecture Court at Calcutta reviewed the estimable potentialities of Atomic Energy for India, which had the richest deposits of raw materials for its manufacrure and research. Dwelling on the importance of the subject, Dr. Saha said that India had the richest deposits of Thorium in Travancore and pockets of Uranium in various parts of India. He stressed the need for encouraging fundamental research in Atomic Enegy and teaching in selected centres in India.

FACTS THAT INTEREST

Mechanical Rice-Growing in Malaya.

The first part of an experiment in mechanical rice-growing, through which it is hoped to revolutionize rice production and bring an improved standard of life to millions has been successfully completed in Malaya. A machine designed to prepare the ground for sowing had already proved a success in the Malayan experiment and now a "Transplanter" *capable of working in water-logged paddy fields had been sent out* there for tests. The experiment which was started a year ago, was one of a number of schemes to increase the standard of living of peoples and to provide more food for the world. An area of 1000 acres near Narudu Bay, British North Borneo was proposed to be allotted for mechanical rice-growing and if it proved successful, 50,000 more acres would be put under the plough. Mechanical rice-growing is still in the experimental stage, the important element for consideration being control of irrigation since machines could not be expected to work in two or three feet of water.

Chemical Weed-Killer to aid Rice-Production.

The outstanding British agricultural discovery of a selective weed-killer known as methoxone, which has produced increases of more than 20 per cent in the yield of cereal crops by destroying weeds has been tried for possible application to the growing of rice at the research station in Berkshire, England.

Weeds normally rob cereals of nutriment. Hand weeding not merely demands the expenditure of a great deal time and energy but in many cases involves loss of young plants because they are uprooted or disturbed in the process of removing the faster-growing weeds.

Research proved that, in general, plants which began life with two leaves suffered from the application of hormones, whereas plants which started with a single leaf were immune from ill effects. It therefore meant that a synthetic hormone could be sprayed over growing crops to kill weeds without damaging cereals. Agricultural trials were taken in Great Britain in 1945 in this regard. More than 13,000 acres of land of all types were sprayed at different stages of growth to determine the most effective use of the new method. Cereal, grass and linseed crops all showed a marked stimulus after the spraying, as if they had been heavily fed with nitrogen. They continued to flourish after the spraying and on an average produced 22 per cent higher yield than the control areas under similar conditions. At the same time, weeds began to show signs of wilting within 12 hours of spraying and normally died off within a few weeks. Experiments in the appli-

cation of methoxone to crops in tropical and other overseas is still in progress. The present series of experiments in Berkshire may be most important of all to rice-growing areas.

Improved Method of Sulphuric Acid Production.

A cyclic process for the manufacture of sulphuric acid developed in an acid plant in Canada is described in the December, '47 issue of *Canadian Chemistry and Process Industries*. Acid production has been doubled by increasing the concentration of SO_2 in the feed to standard contact units and by redesigning an obsolete 35 ton per day capacity plant to operate a process involving the use of pure SO_2 and pure Oxygen. Daily production of 200 tons of 100% H_2SO_4 has been achieved by this process. Pure SO_2 available from roaster gases is absorbed in a solution of ammonia and subsequently regenerated by acidification of the solution.

In the new process sufficient sulphur dioxide and oxygen are fed to a circulating gas stream to provide 25 per cent sulphur dioxide and 30 per cent oxygen in the gas fed to the converter system. The residual gas mixture after removal of sulphur trioxide is replenished with sulphur dioxide and oxygen and returned to the converter.

World's Biggest Eye.

In the observatory on 5,500 Foot Mount Palomar, 30 miles from the Pacific Ocean near San Diego, California, man has perfected the world's biggest eye, a telescope with a diameter of 200 inches which has begun to peer at the heavens. Astronomers hope to penetrate to a depth of one million *light* years, with this telescope. A light year is the distance light covers in one year at a speed of 186,000 miles per second. One light year figures roughly 5,880,000 million miles. Thus what the giant lens-mirror is hoped to picture on a photographic plate will be about 5,880,000,000,000,000,000 miles in as yet unseen and unexplored regions of space. Stars and their clusters and nebulae will appear as they existed *one million years ago.*

The penetrating power and the infinitesimal accuracy, required for the lens constituted "man's most daring optical job". Never before has such a huge chunk of glass been polished to equal accuracy. The specialists of the California Institute of Technology at Pasadena worked on the 145 ton disc of glass for 12 years. The lens which was cast into shape near New York City was carefully transported across the continent for grinding at Pasadena. Thirty one tons of various fine polishing materials were used to remove a total of 5¼ tons of glass. In the most delicate end stages, not more than a third of an ounce of glass was taken off the giant lens in a week. This meticulous job shaped the exact concave (parabolic) curvature that makes it possible to concentrate the heavens dim light on to a photographic plate.

Celestial reflections are thrown by the telescopes mirror into a 60-foot tube at the end of which the camera is located. The lens is but a part of the telescope structure which is as big in overall size as it is accurate in performance. The 500 ton instrument, six stories high, moves on an oil film which by means of pumps is kept an accurate 0·003 inches thick to assure exact movements under finger-tip pressure. The lens itself is accurate to within two-millionth of an inch. Everyone of the telescope's structural parts is accurate to one-thousandth of an inch.

The polishing was finished and after receiving its reflective backing in an aluminium bath the lens was transported carefully by trucks under escort the 130 miles from Pasadena to the wind-swept Palomar summit. There, in utter seclusion, the best astronomical minds in America are now venturing farther out into space than ever before to extend man's knowledge of the universe.

Indian Experiments on Radiosonde.

A delicate radio-transmitter for sounding the atmcsphere has been evolved by Indian scientists, according to a paper published by the Indian Metereological Department.

During the war, when air operations became widespread, the Metereological Department had to extend its activities. One of the programme they embarked on was. to develop a radiosonde, simple to construct from the materials and resources available in the country.

The instrument designed was a fan-type radiosonde which made use of a paper fan in place of ready-made clocks or clocks mechanism. The radiosonde is attached to a hydrogen-filled balloon and let loose in the air. As it rises, the fan rotates and the instrument sends radio signals. The signals are recorded on a special equipment on the ground and the data evaluated in terms of atmospheric pressure, temperature and humidity.

The wireless signals from the balloon are received and recorded on a moving paper tape after amplification so that they can be counted easily. This instrument is one of the simplest in the field of Radio-meteorography.

Chemical Fights Petrol Fire.

A new and highly effective means of combating the appalling danger of fires in aircraft, lorrics and tankers was demonstrated in Manchester recently.

Methyl-iodide, the new element employed, was "discovered" by a Manchester scientist, following upon the observations of other research workers that iodides had an effect on combustion.

The use of the chemical was demonstrated on ignited petrol in water tanks. When it was applied in a continuous spray by means of a stirrup pump, a fire in a small tank was extinguished in a matter of seconds. When alarge tank was set on fire, the flames were driven from one end of the tank to the other and the finally subdued.

FACT NEWS

OUR MODEL PADDY FARM.

"The soul dares not believe its own marvellous guesses and instincts unless it can fall back on definite dogma for confirmation".

Coventry Patmore.

With a view to educate the local agriculturists in the efficacy of the use of the fertilisers and to familiarise them with scientific methods of agriculture, a model farm was operated under the supervision of our Agricultural Chemist. Our paddy field near by was chosen for this purpose. A partnership arrangement was entered into between the company and some of the local agriculturists, by which the work of ploughing, bunding, irrigating and other operations were to be carried out by the local agriculturists under the guidance of our Agricultural Chemist.

A description of the relevant operations conducted for the Punja crop cultivation and the results obtained thereby are given below:

1. Preparation of the land:

First, wood ash amounting to 1100 lbs. per acre was scattered over the field, and then the land was ploughed 5 times. Thereafter during the puddling process, green leaf manure of a composite nature collected locally was applied at the rate of 1100 lbs. per acre. Three days after the incorporation of the green leaf the land was once again ploughed three times and then levelled. The application of wood ash and green leaf constituted the basal manuring for the crop.

2. Sowing:

The variety of seed used was "Cheera" obtained locally. The seed was immersed in water for 12 hours and was then kept in a cool moist place for 24 hours with frequent sprinkling of water for quick germination. It was then broadcast over the field. 6½ parahs of paddy seeds per acre (weighing 114 lbs.) were thus sown. The sowing was conducted on the 22nd of Dhanu 1123 corresponding to the 6th of Jan. 1948.

3. Top-dressing (Fertilising):

On the 15th day after the sowing, 90 lbs. per acre of fish scrap manure obtained locally at a cost of Rs. 15/- was broadcast.

On the 30th day after sowing, Ammonium Sulphate at the rate of 1 cwt. per acre was broadcast. The total quantity of Ammonium Sulphate was divided into several heaps in proportion to the different areas of the fields so as to obtain the maximum degree of uniformity. Care was taken to irrigate the fields and the level of water was kept at about 4 inches and all the outlets were blocked to ensure that the water did not run off for a period of at least three days, in order to enable the Nitrogen to get fixed in the soil.

4. Irrigation:

The fields were irrigated before sowing. There was standing water for about one inch at the time of sowing. The next irrigation was made 7 days after the germination was complete. The irrigation was continued thereafter and care was taken to see that there was always sufficient standing water in the field.

5. Weeding:

As there were no weeds, no weeding was found necessary.

6. Insect pests:

A slight attack by Rice Case Worm (Nymphula depunctalis) was noticed in two fields, and it was promptly checked by the spray of dilute D. D. T. solution. Two sprayings were given on alternate days.

7. Harvesting:

Harvesting was done on the 17th of Meenam corresponding to the 30th March, 1948, just under 3 months from the date of sowing. The total gross yield of paddy per acre was 137 parahs, or 2404 lbs. of paddy. 928 bundles of straw weighing about 3714 lbs. were also obtained.

Conclusion:

The previous best yield of this land has been only 1365 lbs. per acre. By proper use of the fertilisers the yield increased to 2404 lbs. per acre —a very satisfactory result indeed.

DEMONSTRATION FARM.

One acre of paddy land in the Veliyathunad area, Parur Taluk out of a large area that is being cultivated there under the Lift Irrigation Scheme of the Government of Travancore, has been selected by FACT for running a demonstration farm with a view to educate the farmers in the methods of scientific manuring. Our Agricultural Chemist is in charge of this work. 1 cwt. of Ammonium Sulphate, 1 cwt. of Super Phosphate, 3 cwts. of groundnut cake and 1 cwt. of fish scrap have been already supplied by FACT free for this purpose. The application of the manures was conducted under the direction of our Agricultural Chemist. The cumulative effect of the manures has already become demonstrable and is seen in bold relief amidst the surrounding fields in that area.

AGRICULTURAL CONFERENCE.

Mr. T. S. Ramakrishnan, our Agricultural Chemist, was deputed to attend the conference convened under the auspices of Crops and Soil Wing of the Board of Agriculture and Animal Husbandry at Rajaji Hall, Mount Road, Madras between the 7th and 10th of April, 1948.

DISTINGUISHED VISITORS.

The Burmese Industrial Delegation of the Government of the Union of Burma headed by U Mya visited the factory on 28th March, 1948.

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Mr. A. Moch of Louis Dryfus & Co Ltd., Mr. Fernand Blondel, "Ingenieur Chef des Mines," and Mr. Guntur Narasimha Rao, M. L. A. (Madras) visited the factory on 7th April, 1948.

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Sardar Bahadur Sir Datar Singh, Kt., F. R. S. A., Vice-Chairman, Indian Council of Agricultural Research, New Delhi accompanied by the Agricultural Commissioner, Government of India, the Agricultural Marketing Adviser, Government of India and the Director of Agriculture, Madras visited the factory on 16th April, 1948. Sir Datar Singh has sent to the Editor the following note about his visit to our factory.

"I visited the Fertilizers & Chemicals, Travancore Ltd, Alwaye, today in company with Agricultural Commissioner, Agricultural Marketing Adviser and Director of Agriculture, Madras. The representatives of the firm first explained the whole process of manufacture of fertilisers from a miniature model and later showed us round the different portions of the plant. We were told that the Producer Gas Plant was the first of its kind in the whole world to use wood directly for the production of the synthesis gases for the manufacture of Ammonia. The other important raw materials were gypsum and sulphur, which were being obtained from mines in Trichinopoly and U. S. A. respectively. As yields of crops in India are lowest in the world and one of the quickest way of increasing them, especially in irrigated areas, is to add manure and fertilisers, the need for the production of these materials, particularly at this juncture when there is urgent need for increased production of foodgrains in the country, is paramount. The attempts of the firm, therefore, to install this plant to supply manures to cultivators are commendable. I am glad to know that though the plant is running at less than half the capacity now, it will soon be in full swing producing about 50,000 tons of ammonium sulphate and 30,000 tons of super phosphate annually and is the biggest plant at the present time for the manufacture of these fertilisers in the country........................."

വളങ്ങൾ ഉപയോഗിക്കേണ്ട ക്രമം

Translation of the Article contributed
by
T. S. Ramakrishnan, Agricultural Chemist,
F. A. C. T. Ltd.

1. നെൽകൃഷി.

ഏക്കറൊന്നിന് ചേർക്കേണ്ട അളവ് } അമോണിയം സൾഫേററ് 100 മുതൽ 150 റാത്തൽ വരെ.

സൂപ്പർഫാസ്ഫേററ് 112 മുതൽ 224 റാത്തൽ വരെ.

ചേർക്കേണ്ട സമയം: വയലുകളിൽ ചേറുപുരട്ടി ഉഴവുമ്പോഴൊ(Puddling) അതിനു മുമ്പായിട്ടൊ സൂപ്പർഫാസ്ഫേററ് ചേർക്കേണ്ടതാണ്. എന്നാൽമാത്രമെ പിന്നീടുള്ള ഉഴവുകളിൽ അതു് മണ്ണുമായി പൂർണ്ണമായി യോജിക്കയുള്ളു. അങ്ങനെ ശരിയായ ഒരു സങ്കലനം പരിപൂർണ്ണമായ ഫലപ്രാപ്തിക്ക് വളരെ ആവശ്യമാണ്.

ഞാറുകൾ നട്ടതിനുശേഷം ഏകദേശം ഒരുമാസം കഴിഞ്ഞിട്ടാണ് അമോണിയം സൾഫേററ് ചേർക്കേണ്ടതു്. വളരുവാൻ കാലദൈർഘ്യം വേണ്ടിവരുന്ന ഇനങ്ങളാണെങ്കിൽ അമ്പതൊ അറുപതൊ ദിവസം കഴിഞ്ഞു് അമോണിയം സൾഫേററിട്ടാലും മതിയാകും. ഇങ്ങനെ വൈകിയുള്ള വളം ചേർക്കൽകൊണ്ടു് ആദായകരമായ അനുഭവമാണ് ഉണ്ടാവുക. ആദ്യമേതന്നെ സൂപ്പർഫാസ്ഫേററ് ഇട്ടിട്ടില്ലെങ്കിൽ അതും അമോണിയം സൾഫേററും തമ്മിൽ നല്ല വണ്ണം കലർത്തി ഉപയോഗിക്കാവുന്നതാണ്.

ചേർക്കേണ്ട വിധം. രണ്ടു വളങ്ങളും വയലിലെ എല്ലാഭാഗത്തും ഒരുപോലെ വീഴത്തക്ക വിധത്തിൽ വിതറേണ്ടതാണ്. വളമിടുന്നതിനുമുമ്പ് കൃഷികൻ തനിക്ക് അവിടവിടെയായുള്ള നിലങ്ങളുടെ വിസ്തീർണ്ണമനുസരിച്ചു് അവ ഓരോന്നിലേക്കുമുള്ള വളം പ്രത്യേക കൂമ്പാരങ്ങളായി വീതിക്കുന്നതു് പ്രയോജനകരമായിരിക്കും. ആവശ്യമെന്നുതോന്നുന്നാപക്ഷം, വളത്തിൻെറകൂടെ കുറെ നേരിയ മണലൊ, മണ്ണൊ ഏകദേശം വളത്തിൻെറ നാലിരട്ടി കലർത്തിയതിൻെറ ശേഷം കൈകൊണ്ടു് മെല്ലെ വിതറിയാൽ മതിയാകും. ഇതിൻെറകൂടെ ഏതെങ്കിലും പിണ്ണാക്ക് വളമായിട്ടു് ചേർക്കണമെങ്കിൽ 112 റാത്തൽ അമോണിയം സൾഫേററിന് 400 റാത്തൽ പിണ്ണാക്ക് എന്ന ക്രമത്തിൽ കലർത്തി ഉപയോഗിക്കാം. അങ്ങിനെയാണെങ്കിൽ അതിൻെറകൂടെ മണ്ണൊ മററൊ ചേർക്കേണ്ട ആവശ്യമില്ല. പച്ചില വളത്തിനു പുറമേയും അമോണിയം സൾഫേററ് ഇടാറുണ്ട്. ഇതിന് ഏകദേശം 2000 റാത്തൽ പച്ചിലവളം ആദ്യമെ ചേർത്തു് ഭൂമിയോടു് യോജിച്ചിട്ടുണ്ടായിരിക്കണം.

ഫലസിദ്ധി. അമോണിയം സൾഫേററിൽനിന്ന് 20 മുതൽ 21 ശതമാനം വരെ നൈട്രജൻ ലഭിക്കുന്നു. അമോണിയം രൂപത്തിലുള്ള ഈ നൈട്രജനോടു് നെൽച്ചെടികൾക്ക്

ഒരു പ്രത്യേക പ്രതിപത്തിയുണ്ടു്. വളം ചേർത്താൽ ഉടൻതന്നെ നൈട്രജൻ ലഭിച്ചുതുടങ്ങുകയും ഒരാഴ്ചക്കുള്ളിൽപോലും അതിന്റെ ഫലം കണ്ടുതുടങ്ങുകയും ചെയ്യുന്നു. വർദ്ധമാനവും ഉന്മേഷപൂർവ്വവുമായ വളർച്ച, ആരോഗ്യത്തെക്കുറിക്കുന്ന കടുംപച്ചനിറം, ധാരാളം ചിനപ്പുകൾ പൊട്ടി ആർത്തുപിടിച്ചുള്ള വരവു്, സർവ്വോപരി നെല്ലിന്റേയും വയ്ക്കോലിന്റേയും വിളവിൽ ഗണ്യമായ വർദ്ധനവു് ഇതെല്ലാം അമോണിയം സൾഫേറ്റു് ഉപയോഗിച്ചാലുണ്ടാകുന്ന പ്രത്യക്ഷ ഫലങ്ങളാണു്.

ഫാസ്ഫറസിന്റെ കുറവുകൊണ്ടു് നമ്മുടെ മണ്ണിൽ സാധാരണ കണ്ടുവരാറുള്ള ഗൗരവതരമായ ദൂഷ്യങ്ങൾ സൂപ്പർഫാസ്ഫേറ്റു് പരിഹരിക്കുന്നു. ശരിയായ വിധത്തിൽ ഫാസ്ഫറസ് ലഭിക്കുമ്പോൾ ചെടികളുടെ വേരുകൾ വേഗം വളരുന്നു; എളുപ്പം പൂർണ്ണവളർച്ചയെ പ്രാപിക്കുന്നു; പുഷ്പിക്കുന്നതിനും കായ്ക്കുന്നതിനുമുള്ള കഴിവു് അധികരിക്കുന്നു; ഇതിന്റെയെല്ലാം ഫലമായി വൻതോതിലുള്ള വിളവുവർദ്ധനവും അനുഭവപ്പെടുന്നു.

2. കരിമ്പുകൃഷി.

ഏക്കറൊന്നിനു് ചേർക്കേണ്ട അളവു് } അ: സൾഫേറ്റു് 200 മുതൽ 250 റാത്തൽ വരെ.
സൂ: ഫാസ്ഫേറ്റു് 224 റാത്തൽ.

ഉപയോഗിക്കേണ്ട വിധം. ആദ്യമായി ഈ രണ്ടു വളങ്ങളും തമ്മിൽ നല്ലവണ്ണം കലർത്തി യോജിപ്പിക്കണം. എന്നിട്ടു് അതിനെ രണ്ടു സമഭാഗങ്ങളായി പകുത്തു് രണ്ടു പ്രാവശ്യമായിട്ടാണു് ഉപയോഗിക്കേണ്ടതു്. ഇതിൽ ആദ്യത്തെ പകുതി കരിമ്പു കുത്തുന്ന കാലത്തു് (തോടു കീറി വാരം കോരുന്നതിനു മുമ്പു്) കൃഷിഭൂമിയിലാകെ വിതറണം. രണ്ടാമത്തെ പകുതി കരിമ്പിനു് ചിനപ്പുകൾ പൊട്ടിക്കൂടുന്നസമയത്തു്. അതായതു് നട്ടിട്ടു് മൂന്നോ മൂന്നരയോ മാസമാകുമ്പോൾ വാരങ്ങളുടെ നടുവിൽ ഇടണം. ഇതിന്റെ ശേഷം നന്നായിട്ടുള്ള ഒരു ജലസേചനവും ആവശ്യമാണു്. ഈ വളങ്ങൾക്കും പുറമെ പിണ്ണാക്കുകളും (നിലക്കടല പിണ്ണാക്കു്) കരിമ്പുകൃഷിക്കു് വളമായി ഉപയോഗിക്കാറുണ്ടു്. ഏക്കറൊന്നിനു് 600 മുതൽ 700 റാത്തൽവരെ നിലക്കടലപിണ്ണാക്കു് വളങ്ങളുടെ കൂടെ ചേർക്കാവുന്നതാണു്. അതായതു് കരിമ്പുകൃഷിക്കു് മാതൃകാപരമായ വളങ്ങളുടെ തോതു് താഴെ കാണിച്ചിരിക്കുന്ന രീതിയിലാണു്.

അ: സൾഫേറ്റു് 200 മുതൽ 250 റാത്തൽ വരെ.
സൂ: ഫാസ്ഫേറ്റു് 224 റാത്തൽ.
നിലക്കടലപിണ്ണാക്കു് 600 മുതൽ 700 റാത്തൽ വരെ.

പൊട്ടാഷ് കുറവായിട്ടുള്ള ഭൂമികളിൽ (ഉദാ: പടിഞ്ഞാറൻ തീരഭൂമിയിൽ, ഏക്കറൊന്നിനു് 50 റാത്തൽ പൊട്ടാഷ് കിട്ടത്തക്ക വിധത്തിൽ പൊട്ടാഷ്യം നൈട്രയിറ്റു് മുതലായ വളങ്ങൾ ഉപയോഗിക്കേണ്ടതാണു്. പൊട്ടാസിയം നൈട്രയിറ്റിനു പകരം ഏക്കറൊന്നിനു് 1000 മുതൽ 1250 റാത്തൽവരെ മരത്തിന്റെ ചാരം ഇട്ടാലും മതിയാകും.

3. വാഴകൃഷി.

വാഴ ഒന്നിനു് ഇടേണ്ട അളവു് } അ: സൾഫേറ്റു് 4 ഔൺസ്
സൂ: ഫാസ്ഫേറ്റു് 4 ഔൺസ്

ഉപയോഗക്രമം: ഇവ രണ്ടും

തമ്മിൽ നല്ലപോലെ കലർത്തി യോജിപ്പിച്ചു് വാഴയുടെ കടക്കചുററും ഇടണം. കടയോട്, അധികം അടുക്കാതെ ഏകദേശം ഒരടി അകലത്തിൽ വളമിട്ടിട്ടു് ഒരു ചെറിയ അടുക്ക് മണ്ണുകൊണ്ടു് മൂടുകയും ചെയ്യണം. ഇതിനു് നല്ല സമയം വർഷക്കാലമാണു്. മഴയില്ലാത്തപക്ഷം വളമിട്ടതിനുശേഷം നന്നായി നനക്കേണ്ടതു് ആവശ്യമാണു്.

വാഴ നട്ടതിനുശേഷം രണ്ടു മാസം കഴിഞ്ഞിട്ടാണു് വളമിടാനുള്ള ശരിയായ സമയം. രണ്ടോ മൂന്നോ മാസത്തിനുശേഷം വളമിടൽ ഒന്നുകൂടി ആവർത്തിക്കാം. ഇങ്ങനെ രണ്ടു പ്രാവശ്യം വളമിടുകയാണെങ്കിൽ അങ്ങേ അററം ആദായകരമായ അനുഭവം കിട്ടുമെന്നു് തീർച്ചയാണു്.

4. കുരുമുളക്.

കൊടി ഒന്നിനു് ഇടേണ്ട അളവു്:

അ: സൾഫേററ് - 4 ഔൺസ്.

സൂ: ഫാസ്ഫേററ് - 4 ,,

മാതൃകാപരമായ വളങ്ങളുടെ ചേരുവ:

അ: സൾഫേററ് കൊടി ഒന്നിനു് 4 ഔൺസ്.

സൂ: ഫാസ്ഫേററ് 4 ഔൺസ്.

കമ്മായം 6 മുതൽ 8 ഔൺസുവരെ

ഇലച്ചവറ് 20 റാത്തൽ.

ഉപയോഗക്രമം. മുളകുകൊടിയുടെ ചുററും ഒരു ചെറിയ തോടുണ്ടാക്കി അതിൽ അ: സൾഫേററും സൂ: ഫാസ്ഫേററും നല്ലവണ്ണം കലർത്തിയിടണം. ഇതു് മഴക്കാലത്തായിരിക്കണമെന്നുള്ളതു് (ജൂൺ, ജൂലായി മാസങ്ങളിൽ) ഏററവും ശ്രദ്ധിക്കണം. ഇതിൻെറ കൂടെ ഇലച്ചവറു ചേർക്കാമെങ്കിലും കമ്മായം ഒരിക്കലും ഇവയോടൊന്നിച്ചു് ചേർക്കാൻ പാടില്ല. ഇവയോടൊന്നിച്ചു് കമ്മായം ചേരുകയാണെങ്കിൽ നൈട്രജൻ നഷ്ടപ്പെടുന്നു. അമോണിയം സൾഫേററും സൂപ്പർ ഫാസ്ഫേററും ചേർക്കുന്നതിനു് രണ്ടു മാസം മുമ്പൊ, രണ്ടുമാസം പിമ്പൊ മാത്രമേ കമ്മായവും ചാരവും ചേർക്കുവാൻ പാടുള്ളൂ.

മേൽകാണിച്ച മാതിരിയിലുള്ള കാംപോസിററ് ചേരുവ നല്ലമുളകിൻെറ വിളവിനെ തീർച്ചയായും ഗണ്യമായി വർദ്ധിപ്പിക്കും.

5. നാളികേരം.

ചേർക്കേണ്ട അളവു്:

തെങ്ങൊന്നിനു് അ: സൾഫേററ് 4 റാത്തൽ

,, സൂ: ഫാസ്ഫേററ് 6 റാത്തൽ

ഉപയോഗക്രമം. തെങ്ങിൻെറ ചുററും 12 അടി വ്യാസത്തിലും 9 അ: ആഴത്തിലും വൃത്താകൃതിയിലുള്ള ഒരു തടമുണ്ടാക്കി അതിലാണു് വളമിടേണ്ടതു്. വർഷത്തിലല്ലാതെ വേനല്ക്കാലത്തു് ഇതൊരിക്കലും ചെയ്യാൻ പാടില്ല. ഇങ്ങനെ തടമുണ്ടാക്കി വളമിടുന്നതു് വെറുതെ മണ്ണിൽ വിതറുന്നതിനേക്കാൾ മെച്ചമാണെന്നു തെളിഞ്ഞിട്ടുണ്ടു്. ഈ വളങ്ങൾ തെങ്ങുകൾക്കു് ആരോഗ്യം പ്രദാനം ചെയ്യുകയും തൻമൂലം നാളികേരം സമൃദ്ധിയായി വിളയുകയും ചെയ്യുന്നു. തെങ്ങുകളെ ബാധിക്കാറുള്ള രോഗങ്ങൾ മിക്കവാറും മണ്ണിലെ ധാതുക്കളുടെ കുറവുകൊണ്ടുണ്ടാകുന്നതാണെന്നു് പരീക്ഷണങ്ങൾ തെളിയിച്ചിട്ടുണ്ടു്. ഈ

ന്യൂനതകളെ പരിഹരിക്കുവാൻ അമോണിയം സൾഫേറവും സൂപ്പർഫാസ്ഫേറവും അത്യന്തം ഉപയുക്തങ്ങളാണ്. ഇവ ഭൂമിയെ ഗുണഭ്രയിഷ്ഠവും, തെങ്ങുകളെ ഫലസമൃദ്ധവുമാക്കുന്നു.

തെങ്ങുകൃഷിക്ക് മാതൃകാപരമായ വളങ്ങളുടെ ചേരുവക്രമം:

അ: സൾഫേററ് തെങ്ങൊന്നിന് 4 റാത്തൽ

സൂ: ഫാസ്ഫേററ് ,, 6 റാത്തൽ

മരംകത്തിച്ച ചാരം ,, 20 മുതൽ 25 റാത്തൽ വരെ

കന്നുകാലിവളമൊ എക്കലൊ, രണ്ടുംകൂടിയൊ ,, 100 റാത്തൽ.

ഏററവും ഫലപ്രദവും സമ്പൂർണ്ണവുമായ ഒരു ചേരുവക്രമമാണ് മുകളിൽ ചേർത്തിരിക്കുന്നത്. ഇതു് തെങ്ങിൻെറ സകല ആവശ്യങ്ങളേയും നിവർത്തിക്കുവാൻ പര്യാപ്തമാണ്. അമോണിയം സൾഫേററിൻെറ കൂടെ ചാരം ചേക്കരുതെന്ന കാര്യം ഈ ഘട്ടത്തിൽ ഒന്നുകൂടി എടുത്തുപറഞ്ഞുകൊള്ളട്ടെ.

ആമൂലാഗ്രം സകലഭാഗങ്ങളും ഒരുപോലെ പ്രയോജനകരമായതും കല്പവൃക്ഷം എന്ന നാമധേയം അക്ഷരംപ്രതി അന്വർത്ഥമാക്കുന്നതുമായ കേരവൃക്ഷം തീർച്ചയായും നമ്മിൽനിന്ന് ഇന്നത്തേതിലും നല്ല രീതിയിലുള്ള പരിചരണത്തെ അർഹിക്കുന്നു.

6. മരച്ചീനി (കപ്പ).

ഏക്കറൊന്നിന് ചേർക്കേണ്ട അളവ് } അ: സൾഫേററ് 112 റാത്തൽ.

സൂ. ഫാസ്ഫേററ് 100 മുതൽ 150 റാത്തൽ വരെ.

ഉപയോഗക്രമം: മരച്ചീനി കൃഷിക്ക് സാധാരണയായി ചാണകവും ചാരവും മാത്രമെ വളമായി ഉപയോഗിക്കാറുള്ളു. എന്നാൽ അമോണിയം സൾഫേററും സൂപ്പർഫാസ്ഫേററും കൊള്ളി കുത്തിക്കഴിഞ്ഞു് രണ്ടരണ്ടര മാസം കഴിഞ്ഞു് പ്രയോഗിക്കയാണെങ്കിൽ വളരെയധികം ഫലപ്രദമായിരിക്കും.

ചെടികൾക്കു ചുററും വല്ലതുകൊണ്ടും മാന്തി മണ്ണിളക്കിയിട്ട് വളമിടുകയും ഒടുക്കു മണ്ണുകൊണ്ടു് മൂടുകയും ചെയ്യണം. വർഷകാലത്തുമാത്രമെ (ജൂൺ—ജൂലൈ, സെപ്ററമ്പർ, ഒക്ടോബർ എന്നീ മാസങ്ങളിൽ) ഇപ്രകാരം വളമിടാൻ പാടുള്ളൂ. ഈ വളങ്ങൾ ചെടികൾക്ക് പൊതുവേയും വേരുകളുടെ വളർച്ചക്ക് പ്രത്യേകമായും സഹായിക്കുകയും ചെയ്യുന്നു. തന്മൂലം ധാരാളം കിഴങ്ങുകൾ ഉണ്ടാകുന്നു.

മരച്ചീനികൃഷിക്ക് മാതൃകാപരമായ വളങ്ങളുടെ ചേരുവക്രമം:—

ഏക്കറൊന്നിന് ചേർക്കേണ്ടഅളവ് } അ. സൾഫേററ് 112 റാത്തൽ

സൂ. ഫാസ്ഫേററ് 100 മുതൽ 150 റാത്തൽവരെ.

കന്നുകാലിവളം 2 മുതൽ 3 ടൺവരെ

ചാരം 700 മുതൽ 1000 റാത്തൽ വരെ.

ഇതിൽ കന്നുകാലിവളവും ചാരവും കൊള്ളി കുത്തുമ്പോഴും മററു രണ്ടു വളങ്ങളും രണ്ടു–രണ്ടര മാസം കഴിഞ്ഞുമാണ് ചേർക്കേണ്ടതു്.

Licence No. 569 Dated 29th March 1948

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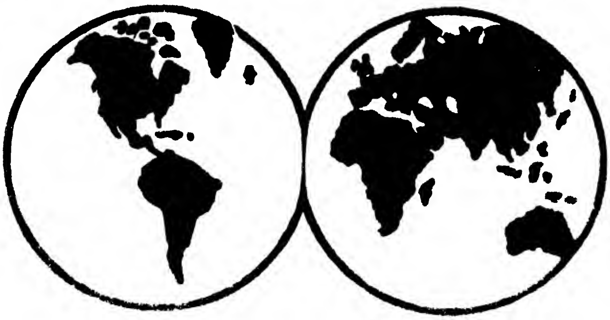
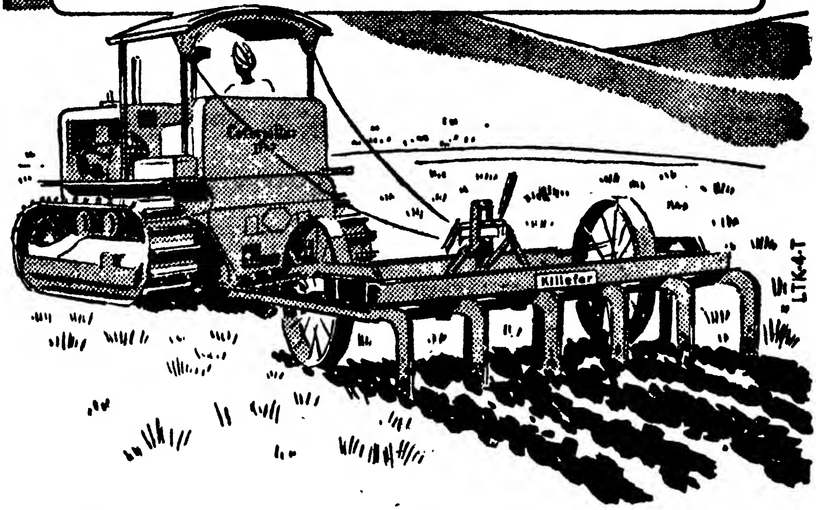
FACT



For deep tilling



CATERPILLAR

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The Killefer Chisel cultivator No. 10GA drawn by the Caterpillar D7 Diesel Tractor is seen doing deep tillage work.

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Advertisements — A to G

On the Cover Page:—

Rajyasevanirata Chattanatha Karayalar presenting a Souvenir on behalf of FACT to H. H. THE MAHARAJA during His visit to the Factory on 22-4-48. Sri V. Seshasayee is seen on the right.